

Mining

CONGRESS JOURNAL



APRIL
1955



Cleveland, Ohio — 1955 COAL SHOW — May 16-19



Here's a Jeffrey shuttle car hauling in a West Virginia coal mine and the payload is just one of the reasons Jeffrey cars are tops. A cable-reel shuttle car with *capacity that pays . . .* and built for rugged service and easy steering under every mining condition — that's Jeffrey!

Another distinctive standard feature of Jeffrey shuttle cars is the two-speed hydraulic drive on the discharge conveyor. It provides *slow* for "jogging" when loading and *slow or fast* for unloading . . . plus the advantage of reversing the chain merely by moving the control lever in the opposite direction.

JEFFREY
shuttle cars really
haul it away!

Other standard hydraulic equipment: 4-wheel steering, 4-wheel disc-type brakes, elevating discharge conveyor, cable-reel drive. Also standard: selective two-speed, full-magnetic traction control, sealed-beam headlights, U. S. Bureau of Mines approval plate.

Type	Basic Height	Maximum with Sideboards
MT68	24" or 26"	32"
MT66	30" to 42"	48"
MT67	44" to 54"	60"

Jeffrey shuttle car payloads can be matched to *your* mining height!

JEFFREY ... for continuous mining...see us at the Coal Show

THE JEFFREY MANUFACTURING COMPANY • COLUMBUS 16, OHIO

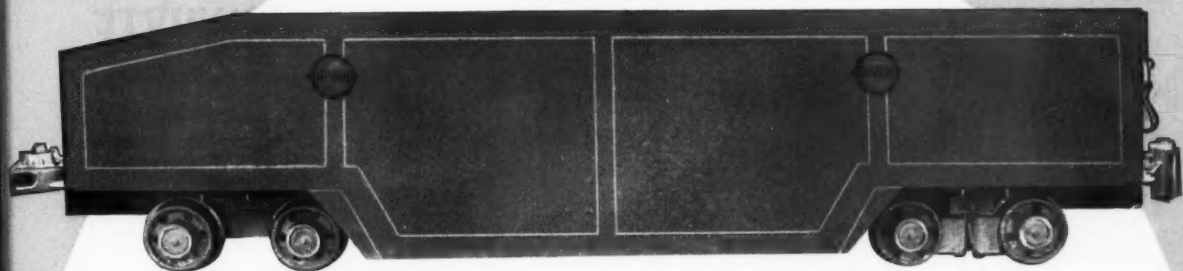
IRWIN

*has a car to suit
your mining
conditions*

- West Virginia sales office, Howard Thomas, 701 Jefferson Ave., Huntington 4, W. Va.
- Central Pa. sale rep. James M. Miller, P. O. Box 617, Johnstown, Pa.
- Export Manager, Alfred Teschen, Bessemer Building, Pittsburgh 22, Pa.

All steel welded body—high capacity—patented trucks and body design—greater flexibility—quality construction—low maintenance costs.

8-WHEEL STREAMLINER

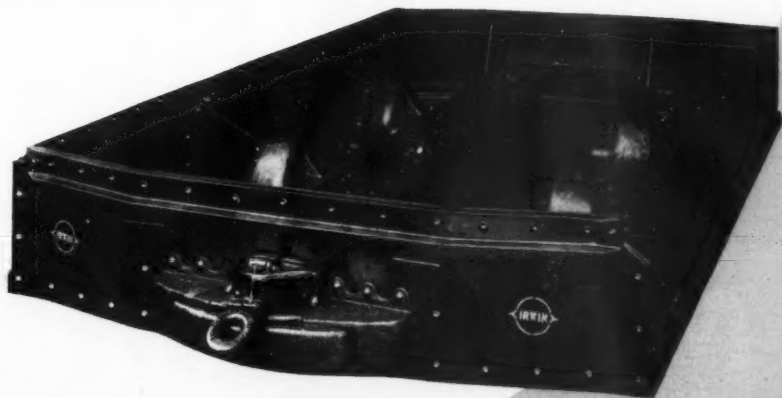


4-WHEEL MINE CAR

Ruggedly constructed throughout — designed for your particular operation—long lived.

HI-CAPACITY CAR

For low coal — welded or riveted construction—designed for your needs.



The more tons per car per day the lower the transportation cost per ton. IRWIN cars mean dividends to you in the form of lower costs. Facts and figures prove it. May we show you the record? Write today.

IRWIN

FOUNDRY & MINE CAR COMPANY

PHONE 800 IRWIN, PA. BOX 311



**Here's Rope that takes
the toughest service!**

MONARCH WHYTE STRAND Wire Rope by MACWHYTE

This top quality Rope is available in all classifications—in the size and construction that will serve best on your equipment. MONARCH WHYTE STRAND is highest strength Wire Rope, made of Improved Plow Steel.

To meet the needs of all equipment and the toughest of service conditions, there are a thousand and one types, sizes, and grades of MONARCH WHYTE STRAND Rope. Each of the Wire Ropes in this selection is designed to fill an equipment need and to assure longer, safer service at lower operating cost.

These Ropes are available Internally Lubricated, PREformed, Lang Lay or Regular Lay, Fiber Core, or Independent Wire Rope Core. Wire combinations vary from 42 wires in 6 x 7 construction to 343 wires in 6 x 49 IWRC construction.

Put MONARCH WHYTE STRAND Wire Rope on your equipment. Enjoy the advantages of having the rope that will take the toughest service.

MACWHYTE

WIRE ROPE · SLINGS · WIRE ROPE ASSEMBLIES

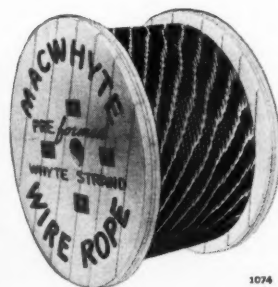
Macwhyte Company • 2952 Fourteenth Avenue • Kenosha, Wisconsin

Manufacturers of: Internally Lubricated, PREformed Wire Rope; Braided Wire Rope Slings; Aircraft Cable and Assemblies; Monel Metal, Stainless Steel Wire Rope; and Wire Rope Assemblies.

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1074

Ask for
MONARCH WHYTE STRAND
Bulletin 5425.

For the proper Wire Rope size and construction for your equipment, request a Macwhyte recommendation.

Make R & S your Headquarters at the Coal Show—



Drop in anytime — you're always welcome at our centrally located **BOOTH 2100** "at the top of the stairs."

We'll be mighty glad to see you again—and will do everything we can to make your visit at the Show enjoyable as well as profitable.

THESE SERVICES ARE FOR YOUR USE:



SECRETARIAL SERVICE

If you have to dash off a quick letter to your office, or any place else during the course of the Coal Show, chances are you can get exactly the kind of help you need at the R & S booth.



PLAN TO "HANG YOUR HAT" (literally) AT R & S SERVICE HEADQUARTERS

While space, hangers and racks last, we shall be happy to have you use the cloak-room facilities of the R & S service booth.



WHERE'S THE PHONE? AT BOOTH 2100, OF COURSE!

"Where's the telephone?" is usually a problem at trade shows and conventions. However, the 1955 Coal Show will be an exception. Feel free to use the telephone facilities provided at R & S booth 2100, "at the top of the stairs."



REST AND READ... OR VISIT

The central location of R & S booth 2100, "at the top of the stairs," makes it a good central point for starting out or ending up, for meeting friends, or for just plain relaxing in a soft, comfortable easy chair.



UP-TO-DATE DATA ON R & S EQUIPMENT AND SERVICES

Booth 2100 will have ample stocks of all up-to-date Roberts and Schaefer Co. literature. Your visit to the booth will be a good chance to bring your R & S literature file up to date.



AND "COFFEE-AND"

It's always "coffee-and" time at R & S Coal Show Service Headquarters "at the top of the stairs." We hope you will plan to stop and have a cup of coffee with us while you are at the Show. We will enjoy seeing you and we believe you will enjoy the "coffee-and."

Do you have these Roberts & Schaefer publications?

"Preparation Parade", Bulletin 174—gives complete operating data on five well engineered and well run coal preparation plants. Twelve pages in color.

"Have Your Coal Test-Cleaned", Bulletin 178—Illustrates and describes the full-size equipment at R & S Harvey, Ill. plant for air washing, wet washing and heavy media separation; tells how you can secure complete laboratory report without charge for recommendations or use of equipment.

"Air Washing Coal", Bulletin 175—complete information on R & S Super-Airflow coal cleaning units with drawings and specifications of various size units, typical flow sheet and other useful data. Eight pages in color.

"Wet Washing Coal", Bulletin 176—Shows complete line of R & S wet washing equipment with cut-away illustrations, dimensional drawings and capacity charts. Eight pages in color.

Secure these Bulletins at Booth 2100 or write direct

ROBERTS and SCHAEFER COMPANY

Subsidiary of Thompson-Starrett Company, Inc.

ENGINEERS and CONTRACTORS

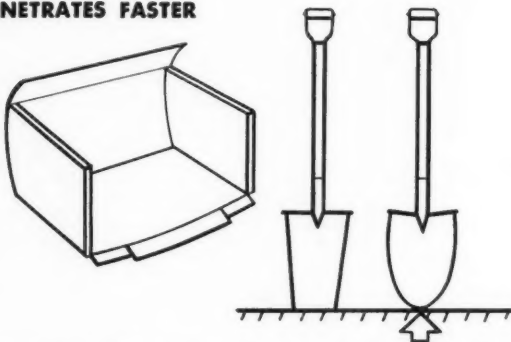
130 North Wells Street, Chicago 6, Illinois

Pittsburgh 22, Pa.—Henry W. Oliver Building • New York 19, N. Y.—254 West 54th Street • Huntington 9, W. Va.—P. O. Box 570
Hibbing, Minnesota—P. O. Box 675

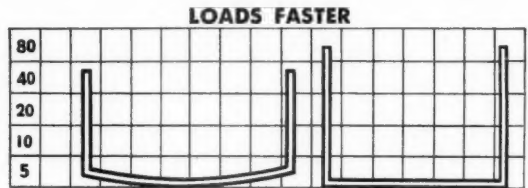
Compare these dirt-moving features before you buy

Check over these Allis-Chalmers TS-200 Motor Scraper features point by point. See for yourself how performance makes dollars when design makes sense.

PENETRATES FASTER

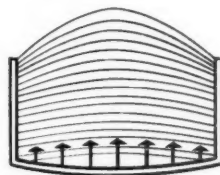


The penetrating ability of a round-end spade helps illustrate how the curved and offset cutting edge on Allis-Chalmers Motor Scrapers concentrates all the horsepower on the center section during initial penetration.



Tests have proved that loading resistance is largely determined by the height to which the load is built. That's why the lower, wider bowl of an Allis-Chalmers Motor Scraper requires less time and power to get the same yardage.

HEAPS AUTOMATICALLY



The combination of slightly deeper center cut and correctly angled cutting edge shapes the load as the scraper fills. The greater volume of dirt flowing into the center of the bowl "boils" forward, to the rear and to the sides, producing an automatically heaped load without excessive spillage.

SPREADS EVENLY

Forward movement of ejector is timed with lifting action of apron, which provides a continuous flow of material to insure a smooth, even spread. High apron lift prevents any possibility of material's jamming.



Write for literature and additional information on this earth-moving value or see your Allis-Chalmers dealer.

ALLIS-CHALMERS
TRACTOR DIVISION • MILWAUKEE 1, U. S. A.

APRIL, 1955

VOLUME 41 • NUMBER 4

CONGRESS JOURNAL

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Marion dragline at the Fairview Collieries, Inc., Flamingo Mine, Fairview, Illinois, lays fill for new coal road. Dragline uses Standard greases.



STANDARD OIL COMPANY
(Indiana)

Flamingo Mine uses

CALUMET

Viscous Lubricant for Marion dragline spur gear

A No. 7200 Marion dragline at Flamingo Mine, Fairview, Illinois, is a busy piece of equipment. Its jobs include removing overburden and laying fill for roadbeds. These are rugged chores carried on in all kinds of weather under tough operating conditions. To keep this dragline operating winter, summer, spring, fall, in dust, dirt, and mud, Flamingo Mine lubricates the vital spur gear with CALUMET Viscous Lubricant.

CALUMET Viscous is an adhesive lubricant manufactured specifically for such tough service as this spur gear job. It will not chip off in winter temperatures nor throw off during summer heat. It has the ability to withstand heavy shock loads, has

high load carrying capacity. Its unique properties make it both heat and water resistant.

CALUMET Viscous Lubricant can be applied, without heating, by either gun, brush or swab, without scraping off previously used lubricants — two important advantages.

There is a complete line of CALUMET Viscous Lubricants. They are just a few of the extensive catalog of greases and lubricants available from Standard Oil. Like to know more about them? In the Midwest call your nearby Standard Oil lubrication specialist. Or contact: Standard Oil Company, 910 South Michigan Avenue, Chicago 80, Ill.



R. E. Wright, Standard lubrication specialist, inspects Marion dragline spur gear. Before entering field service work Bob got his engineering degree from Michigan School of Mines. He has completed Standard's Sales Engineering School. Customers find this background and experience pay off for them.

LOOK HIGH...

LOOK LOW...

NATIONAL BRUSHES

TRADE-MARK

ARE YOUR BEST BUY ALL THROUGH MINE AND MILL

The "National" brush line is a *complete* line — offering grades, sizes and types specifically designed for the wide range of operating conditions found in rotary d-c equipment.

COMMUTATION A PROBLEM?

National Carbon research in this field is almost alone responsible for the many special-purpose, high-commutation brush grades, now standard in the industry.

COMMUTATOR FILM ACTING UP?

"National" brushes' special film-control properties are especially effective in eliminating film breakdown and threading under difficult extremes of current density and sudden load-swing.

CONCERNED OVER BRUSH LIFE?

With the entire "National" brush line to choose from, you are certain of getting maximum brush life consistent with overall satisfactory brush performance.

There are far more "National" brushes working in mine and mill than any other brand. Find out for yourself why "National" brushes are preferred for main drives and generators, heavy-duty general-purpose and mill-type motors.

The term "National", the Three Pyramids Device and the Silver Colored Cable Strand are registered trade-marks of Union Carbide and Carbon Corporation

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YOURS FOR THE ASKING . . . National Carbon's instructive pamphlet series on the practical aspects of motor and generator maintenance. Supervisors should request

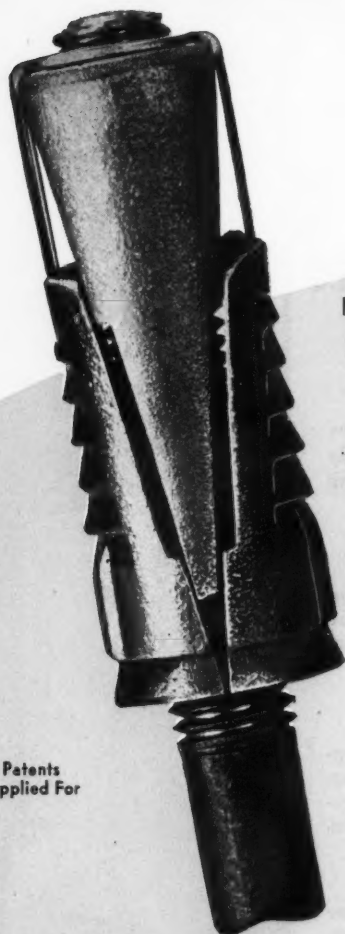
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Patents
Applied For

THERE'S A BIG DIFFERENCE IN "Before-Bolting" and "After-Bolting" PRODUCTION COSTS AND SAFETY RECORDS

From reports (covering periods from 6 months to 2 years) of mining companies that keep strict recordings of production costs and safety—the real story of the advantages of roof bolting is told in the following excerpts taken from their reports—

"we have doubled our section output"—"our direct mining costs have been reduced about 20c per ton"—"have had production increase of 4 tons per man at the face"—"our average tons per man has increased between 10% and 20%." All reported that bolting "greatly improved the mine's safety record." As most mines could derive similar benefits—bolting should justify management's consideration and testing.

Being the largest exclusive manufacturer of roof bolting products—PATTIN Manufacturing Company has the largest and most complete line of outstanding shells, bolts, etc. Our roof bolting experts are available for consultations and tests. Write or phone us at your convenience.

Shown above is the new PATTIN low-cost, fool-proof and trouble-free "D-2" expansion shell featuring a new bail and protective knock-out disc.

and at the COAL SHOW—

Every model of PATTIN'S roof bolting products will be on display and available for inspection in spaces 935-937 (Main Exhibit Hall). Make it a point to see the new improved expansion shells, bolt heads, etc.

PATTIN "The Pioneer in
Roof Bolting"

PATTIN

"67th Year"

MANUFACTURING COMPANY
MARIETTA, OHIO



ENGINEERING
REPORTS:



EASY-TO-EXPAND electrical systems are key feature of modern preparation plants which utilize G-E Engineering Services.

How G-E engineering services save time and money at coal preparation plants

Whether you are planning to modernize, expand, or build a new coal preparation plant, General Electric's complete range of engineering services will help save you time and money.

Working with you and/or your consulting engineers, these services will help:

- **DESIGN** an up-to-date electrical system to meet your individual requirements. G-E Application Engineers utilize latest electrical concepts to give you an easy-to-expand system.
- **DEVELOP** new products for your special applications. G-E Product Engineers utilize vast research and developmental facilities to create new products to meet your particular needs.
- **CUT INSTALLATION TIME.** Experienced G-E Field

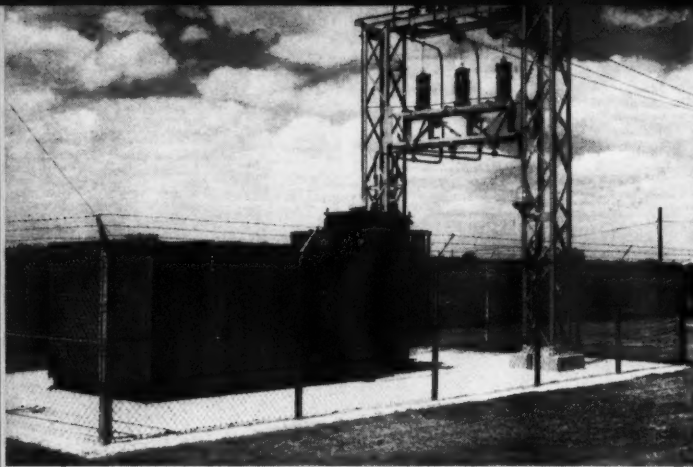
Engineers will help at the installation and start up of your electrical system.

- **CO-ORDINATE** the selection, delivery, and installation of your electrical system. G-E Project Coordination helps eliminate time-consuming paper work by handling these three important functions for you.

Take advantage of these G-E Engineering Services early in your planning stages. Your G-E Apparatus Sales Representative will put them to work for you. Contact him at your nearest Apparatus Sales Office. General Electric Co., Schenectady 5, N. Y. 663-43

CUT YOUR OPERATING COSTS ►

GENERAL  ELECTRIC



RELIABLE source of power is available with G-E master unit substations. Units are factory-assembled to save installation time.



PUSH-BUTTON OPERATION of plant is available with G-E master control boards. They are designed to control vari-

G-E electrical systems help . . .

LOWER YOUR

To meet today's market conditions the Coal Industry is seeking new ways to cut operating costs in preparation plants. One sure way to help lower operating costs is to install a G-E electrical system. **Here's why:**

AUTOMATIC G-E CONTROLS help eliminate unnecessary manual operations. General Electric's modern electrical systems incorporate these controls wherever possible.

LOW MAINTENANCE is an outstanding feature of General Electric electrical systems. Newly-devel-

Engineered Electrical Systems for Coal Preparation Plants

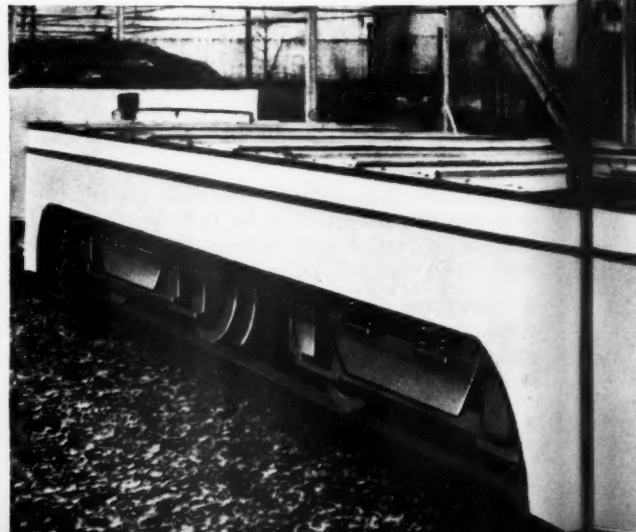


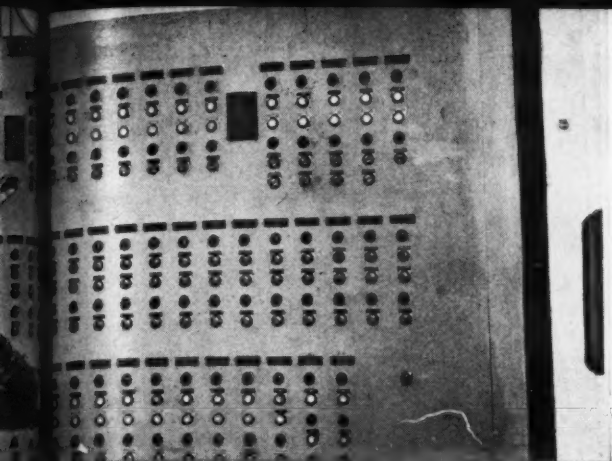
FACTORY-ASSEMBLED G-E unit substations help assure efficient transmission of power to load areas. Addition of G-E capacitors to substations increases capacity and cuts power costs.

COMPACT G-E Cabinetrol* equipment provides centralized control for motors. Custom-engineered, they are easy to expand.
*Reg. trade-mark of General Electric Co.



LOW MAINTENANCE is outstanding characteristic of G-E mine-haulage locomotives. They will help haul more tons





ous cleaning operations from one central location, and give visual indication all units are running.



RUGGED G-E Tri-Clad* gear-motors are packaged, single units. They use little more room than a standard motor, freeing more floor space.

*Reg. trade-mark of General Electric Co.

OPERATING COSTS

oped electric equipment designed for less maintenance is utilized throughout.

EASY TO EXPAND with market conditions is a General Electric electrical system. Its flexible design makes the installation of additional equipment easy and practical.

To learn more about General Electric's modern electrical systems for coal preparation plants contact your nearest G-E Apparatus Sales Representative. General Electric Company, Schenectady 5, New York.

663-43

GENERAL  **ELECTRIC**



COMPLETE LINE of G-E Tri-Clad motors for coal preparation plants are designed for a minimum of maintenance. Totally-enclosed fan cooled construction helps protect motors against dust.

per day to prep plant. Easy-to-operate controls are grouped for the convenience of the operator.

EXPERIENCED G-E ENGINEERS are ready to help design, co-ordinate and install an up-to-date electrical system for your plant.



**How to slash operating costs ...
and get more tons per man-shift ...
greater overall tonnage ...**

Switch to **LONG**
PIGGYBACK® CONVEYOR
Continuous Haulage Mining



Coal discharging from Piggyback Conveyor to Long Room Conveyor. Note how Piggyback rides on top of pan line.

Piggyback® Conveyor working behind loading machine.

The Piggyback Conveyor system provides uninterrupted haulage from the face . . . eliminates costly loading delays common with "stop-and-go" transportation of other systems.

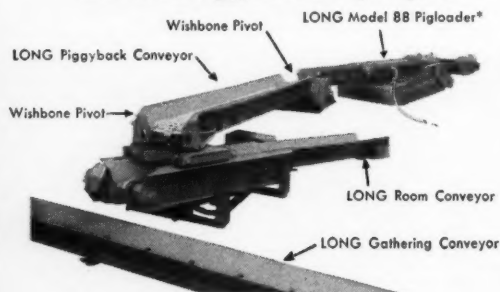
Every day more and more companies are learning that Piggyback Conveyor mining pays off in greatly increased production at greatly reduced operating costs. In fact, at many mines, this unique system has meant the difference between operating at a profit instead of a loss.

With proved, practical Piggyback Conveyor mining, six hours or more loading time per shift is not unusual. Coal is loaded and moved out in a steady, continuous flow—with no down-time waiting for intermittent transportation. The result: more tons per man—higher total tonnages per section. What's more, capital investment per ton for installing the Piggyback Conveyor system is much lower than for any other continuous mining method.

There are, of course, other reasons why low-maintenance Piggyback Conveyor mining is unequalled in efficiency and economy. We'll be glad to give you complete information, without obligation.

*Trade Mark

Units of the Piggyback Conveyor System



The receiving end of the Piggyback Conveyor is attached to the Pigloader Loading Machine and follows it as it moves. Thus, the operator can devote his full attention to loading. Wishbone pivots make possible continuous haulage at 90° angle breakthroughs and dolly action permits long advances without pan-ups.

For complete details or a demonstration, write us today!

The **LONG** Company
OAK HILL, W. VA.



"PACHYDERMATOUS" MINE CABLE

helps keep your mining continuous

That's a five-dollar way of saying that Rome 60 Mining Cables have elephant-tough hides . . . that they're thick-skinned, able to take it.

Of course, any mining cable will wear out eventually. But the right cable will minimize cable service problems, cut down time, keep your machinery producing.

As a good example of what a properly designed cable can mean to you, check these money-saving features of Rome 60 Parallel Duplex Cable.

1. **Flexible**—Tough Neoprene webbing separates the grounding conductor from the insulated conductors. This gives you high impact resistance, low conductor fatigue, better protection against "shorts," while maintaining maximum flexibility.
2. **Overload Protection**—The insulation is compounded for heat resistance to permit continuous operation at 75°C. (167°F.) and adequately protects against deterioration at the high overloads often experienced.
3. **Tough Outer Sheath**—Tire-like toughness is given by the molded-in-lead Neoprene sheath. It protects your cable against impact, acids, oils, abrasion and flame.
4. **Interlocked Construction**—This cross section shows what interlocked construction is . . . the open braid around each conductor locks the conductor to the Neoprene sheath. This interlocked construction prevents separation of conductors from sheath caused by twisting, pulling, flexing.
5. **Meets Codes**—The Neoprene sheath, marked P-105 BM, conforms to State of Pennsylvania and Bureau of Mines Safety Codes.

When you invest in Rome 60 you make your total investment in men and machinery pay off best.



Twisting—The firm interlocking braid prevents loosening of conductors and sheath separation because of twisting and bending.



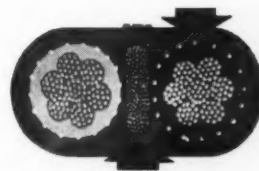
Immersion—Protection against moisture, corrosion and flame assured by the rugged sheath and specially compounded rubber insulation.



Crushing—The Neoprene web between insulated conductors and grounding conductor provides high impact resistance, protects against "shorts."



Abrasion—Tire-tough compact construction, molded in lead, protects Rome 60 Mining Cables against abrasion.



COME TO THE CLEVELAND COAL SHOW
VISIT US IN BOOTH 1205

It Costs Less to Buy the Best



ROME CABLE
Corporation
ROME · NEW YORK
TORRANCE · CALIFORNIA

MARION invites you to the COAL SHOW

In Cleveland, May 16-19



It's Coal Show Time **— Don't miss it!**

At Cleveland, in a few days, you can get up to date on everything new in the Coal Industry.

You'll see old friends, make new ones, hear experts in every phase of the industry and have time to enjoy a little relaxation away from your day-to-day routine.

Come to Cleveland—see the exhibits—hear the programs—and get yourself set for the big things ahead.

1 CLEVELAND AUDITORIUM
where Coal Show sessions and displays are located.

2 HOTEL STATLER
Euclid at East 12th—Club Room 345 at the Statler will be Marion Power Shovel Company Headquarters for the Coal Show.

See your MARION friends in Cleveland

Make it a point to see your friends from Marion Power Shovel Company at the Coal Show.

MARION will have an exhibit in Booth 1003 in the Cleveland Auditorium.

Marion Power Shovel Company headquarters for the Coal Show will be in Club Room 345 in Hotel Statler. We'll be looking for you.



MARION • OSGOOD • GENERAL

MARION POWER SHOVEL CO. • MARION, OHIO, U. S. A.

A Subsidiary of Merritt-Chapman & Scott Corporation



POWER SHOVELS FROM $\frac{1}{2}$ TO 60 CUBIC YARDS
PILE DRIVERS • WALKING DRAGLINES



DRAGLINES • CLAMSHELLS • CRANES • BACKHOES
TRUCK CRANES • MOBILCRANES • LOG LOADERS

Your Confidence Is Justified Where This Flag Flies

coal cutting costs
make you see **Red**?

SEE **BOWDIL***
BOOTH 1006



▲ West Kentucky Coal Company,
Madisonville, Kentucky, cuts costs in
their East Diamond Mine with this
mobile cutting machine using Bowdil
9-ft. Cutter Bar, Bowdil Chain and
new 1-29 Bowdil Bits.

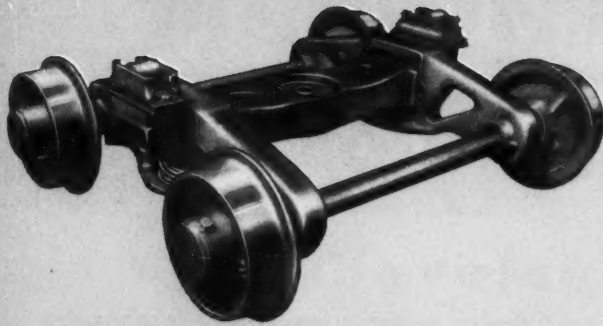


PHOTO BY W.M. VANDIVER FOR WEST
KENTUCKY COAL COMPANY IN COOPERATION
WITH BITUMINOUS COAL INSTITUTE.

The **BOWDIL** *Company*
CANTON, OHIO

* ORIGINATORS OF THROW-AWAY BITS; MANUFACTURERS OF BARS,
BITS, CHAINS AND OTHER PRODUCTS FOR COAL MINING; CUSTOM
MACHINERY DESIGNERS AND BUILDERS; HEAT-TREAT SPECIALISTS;
SALES AGENTS FOR THE CINCINNATI ELECTRIC DRILL.

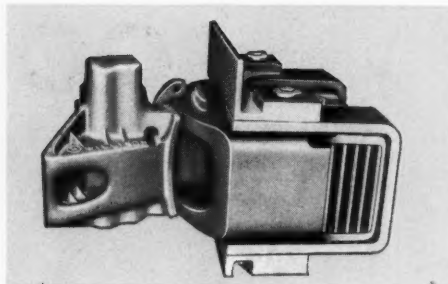
NATIONAL equipment cuts per-ton costs



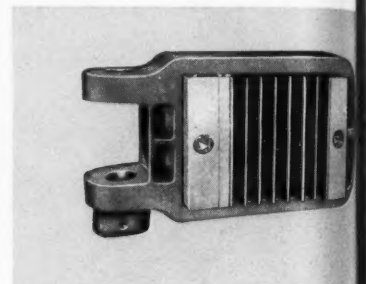
NC-1 MINE CAR TRUCK is the latest example of National's pioneering in better equipment. Among NC-1 truck advantages are longer and softer ride springs, friction damping mechanism that controls vertical and transverse oscillations, automatic frame alignment and cast one-piece bolster with large lubricated center bearing.



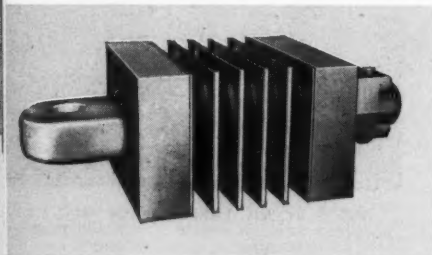
WILLISON AUTOMATIC COUPLERS save time with maximum safety, couple at either end of car or locomotive, require no manual assistance, eliminate damaging slack, permit high speeds with maximum stability.



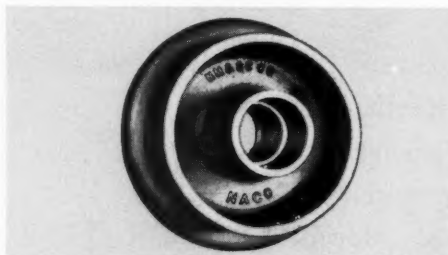
NATIONAL MI-235 Rubber-Cushioned Draft Gear primarily used in Willison spherical-horn coupler assemblies for drop-bottom cars and locomotives; are effective with link and pin bumpers and in strap yokes.



NATIONAL MI-225 Rubber-Cushioned Draft Gear for locomotives and large capacity cars not required to open through rotary dump. Give maximum impact protection in minimum space.



NATIONAL MI-230 Rubber-Cushioned Draft Gear for cars in rotary dump service. High-capacity rubber pads with soft initial action provide maximum impact protection, lengthen equipment life. Available in capacities and designs to fit individual requirements.



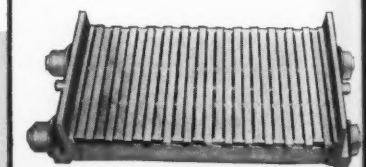
NACO STEEL WHEELS, made from quality-controlled Naco cast steel—of high yield point, great tensile strength and ductility—reduce tread spalling or flange breaking. Available in all sizes regularly used in mining or industrial operations.



NACO STEEL SWIVEL HITCHING AND LINK



CAST ALLOY STEEL ORE-GRINDING BALLS



CAST STEEL PALLET AND MALLIX SINTERING BARS

See us at the Coal Show, Booth 1634

**NATIONAL
MALLEABLE AND STEEL
CASTINGS**



"Progress through Research"
COMPANY • Cleveland 6, Ohio



~~Ten~~ Times Through The Earth! **NOW TWENTY**

The footage drilled by Hughes bits since 1909 exceeds 900,000,000 feet — or more than 20 times through the earth. This represents the world's greatest rock bit drilling experience.

More footage has been drilled with Hughes rock bits in more formations, under more varied conditions, than with all other rock bits combined.

This rock bit performance experience, coupled with continuous research and the close co-operation of the oil and mining industry, enables Hughes to design and perfect bits that drill hole faster and more hole per bit!



This is reprint of Hughes advertisement run in 1951 with footage figures corrected to bring them up to date.



Blacksmith Billy Watkins shanking a Crucible Hollow Drill Rod.

they're using Crucible Hollow Drill Rods on the Boston Tunnel Jobs . . .

400-feet below the city of Boston, two seven-mile tunnels are being cut through solid rock. Replacing century-old mains, the tunnels will bring water from Quabbin Reservoir, 70 miles away, and remove drainage from the city.

On this job, like most other tough ones, Crucible Hollow Drill Rods are in daily use. For experienced construction men *know* they can depend upon Crucible Hollow Drill Rods for top performance at *lowest cost per foot of hole drilled*.

That's because they are made to *tool steel* standards by the nation's leading producer of *special steels*. So for *extra* dependability on *all* your drilling jobs specify Crucible Hollow Drill Rods. *Crucible Steel Company of America, Henry W. Oliver Building, Pittsburgh 30, Pa.*



120-foot-high head frame used to raise and lower men and materials in excavation shaft. Morrison-Knudsen-Kiewit-Maney City Tunnel Extension Job, Boston, Mass.

CRUCIBLE

first name in special purpose steels

Crucible Steel Company of America

NOW! **PIT-BOLT**

MINE ROOF BOLTS

in the New...

$\frac{5}{8}$ " DIAMETER HI-STRENGTH (AISI-C1045) STEEL

or Standard...

$\frac{3}{4}$ " DIAMETER (ASTM-A-7) STEEL

"Pit-Bolts" insure safe roofs at lowest cost.

Produced by one of the world's largest bolt, nut and rivet manufacturers—equipped with the experience and modern facilities to provide roof bolts of highest quality and dependability.

Geographically located to best serve the coal industry, our large stocks of roof bolts enable us to provide excellent service at all times.

"Pit-Bolts" are furnished in either *Expansion Units* or *Split Rods*. The Expansion Unit Bolts are furnished to any specified length in $\frac{5}{8}$ " diameter manufactured from High-Strength (AISI-C1045) Steel, or in $\frac{3}{4}$ " diameter Mild Steel to ASTM Specification A-7 (as illustrated). The $\frac{5}{8}$ " bolts can be supplied with heads dimensionally the same as $\frac{3}{4}$ ", eliminating the need for any change in installation equipment. Both diameters are manufactured with special square head, not chamfered, for greatest efficiency when used with power wrenches.

The threads of "Pit-Bolts" are treated with rust resistant and threaded ends are burlap wrapped for maximum protection.

Write for "PIT-BOLT" Bulletin

... which includes a comparison of physical properties of the $\frac{5}{8}$ " High-Strength Bolt with the $\frac{3}{4}$ " Mild Steel Bolt.

Visit our
BOOTH 620
at the
COAL SHOW!

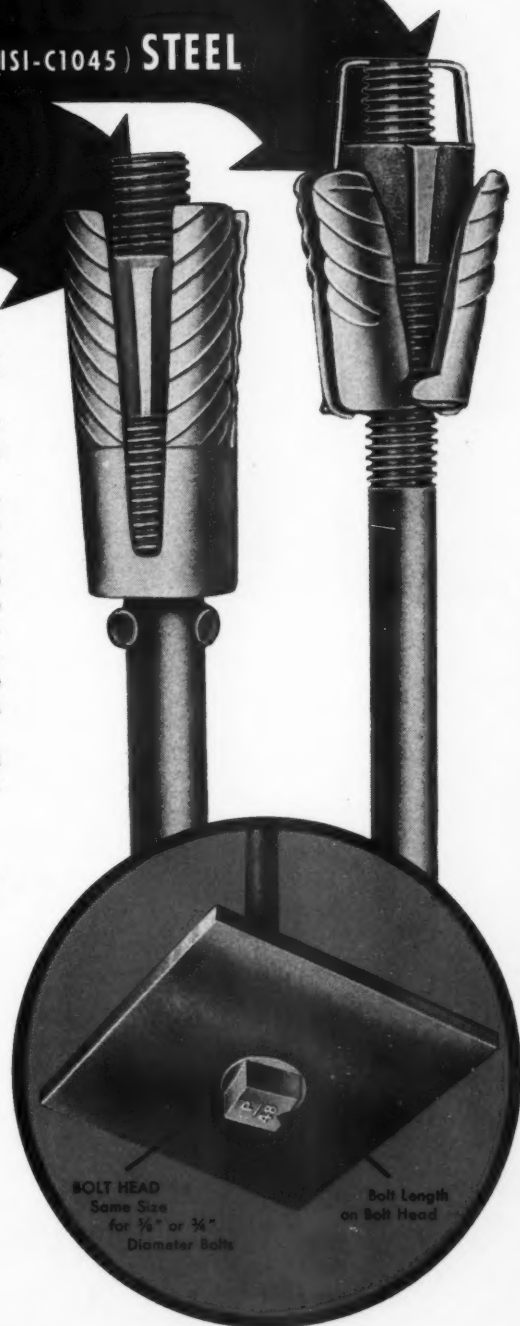


We solicit your inquiries and offer our services on any experimental projects.

PITTSBURGH SCREW AND BOLT CORP.
PITTSBURGH 30, PA.

GARY SCREW AND BOLT DIVISION
CHICAGO 3, ILLINOIS

Offices in Principal Cities





Are You Mechanizing Your Mine to Death?

Visit us
at the
Cleveland Coal Show
Booth 1407



MAINTENANCE EXPENSE of some of today's mining equipment has become so costly that many mine operators are disturbed over the possibility of actually mechanizing their mines to death. Some equipment has been so complicated with "features" that experts are required to keep it in operation. In fact, equipment has become so specialized in purpose that a fortune is required just for tools to mine coal and ore.

We are not advising the return to pick-and-shovel, but we certainly are encouraging the use of equipment that operates with more simplicity, versatility and at less cost. And, the loading machine that operates with that required simplicity, versatility and low maintenance is the Whaley "Automat." Throughout the mining industry the "Automat" has been recognized for many years for its superior mechanical endurance and its dependability in staying with the tough job demanded of a loader in rock work. It's the workhorse of the mining industry—in coal, rock or ore, and if there's ever been a time when mining needed more workhorses and less mechanical "frills," it's NOW!

More than ever, our latest improved Whaley "Automat" is essential for fast removal of rock and at greatest savings. Either the Track Type or Crawler Mounted models are available to suit your requirements. Myers-Whaley Company, Knoxville, Tennessee.

MYERS - WHALEY
MECHANICAL LOADERS EXCLUSIVELY SINCE 1908

Uranium Exploration on the Colorado Plateau!

From the beginning of the current spectacular uranium developments in Colorado, Utah and other Western states, Sprague & Henwood, Inc. has placed its personnel and equipment, fully and competently, at the disposal of both Government agencies and private mining interests.

As a result of this prompt action, backed by a 70-year record of world-wide experience, we have been awarded contracts for many thousands of linear feet of

EXPLORATION DRILLING

in all of its phases, including

Dry-Hole Drilling with Air
using roller and other-type bits,

Non-Core Drilling, with Air or Water
using either diamond or other-type bits, and

Diamond Core Drilling
with Oriented diamond bits.

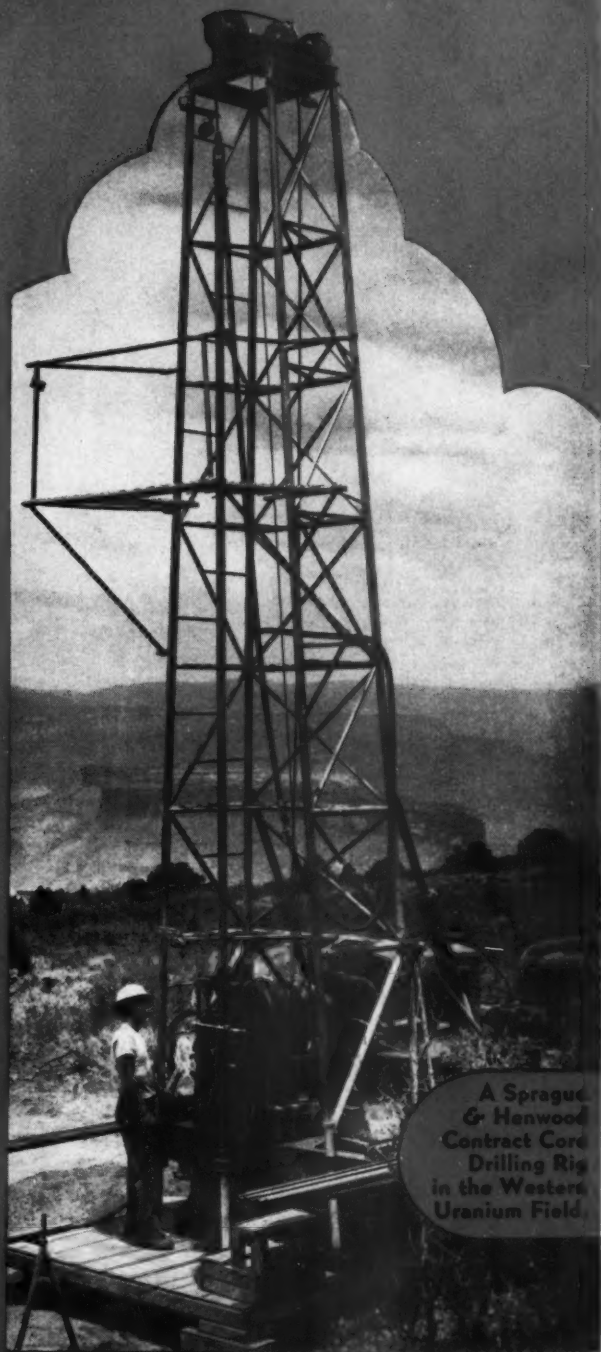
All contracts, except those presently engaged upon have been satisfactorily completed. At present we are busily engaged but, having moved many of our best operators and drilling rigs into the area, are prepared to handle new contracts promptly and efficiently.

A new branch office and shop has been established on the Fruita Highway, near Grand Junction, Colo., to help provide the best possible service throughout the Western uranium field. For quick action, telephone Robert R. Carver, Manager, at Grand Junction 834. He knows the answers to most drilling problems through personal experience.

Sprague & Henwood, Inc. Scranton 2, Pa.

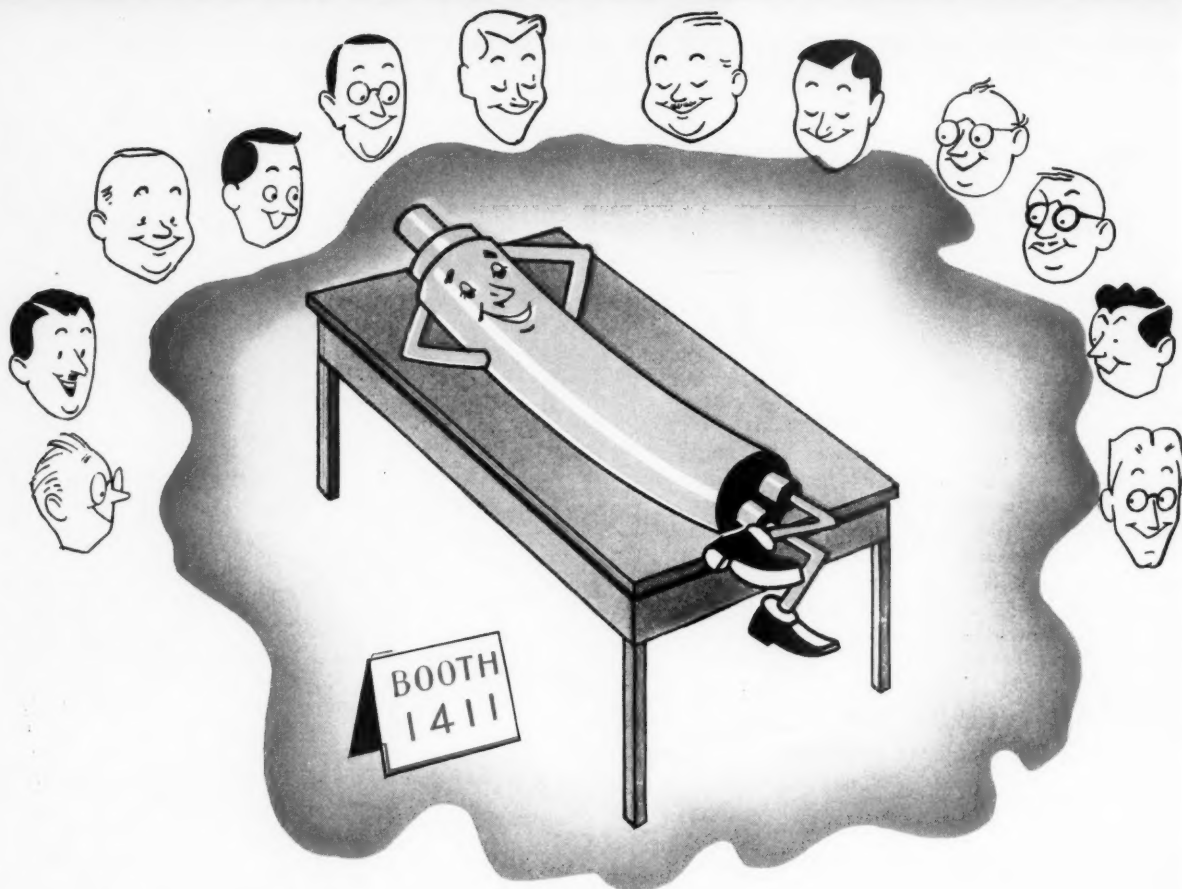
New York Philadelphia Pittsburgh
Grand Junction, Col. Buchans, Newfoundland

Leading Manufacturers, also, of High-Speed Core Drilling Machines, "Oriented Diamond Bits" and complete accessory equipment for Core Drilling and Soil Sampling. Illustrated catalogs mailed promptly on request.



A Sprague & Henwood Contract Core Drilling Rig in the Western Uranium Field.

The Sun never sets on Sprague & Henwood's Contract Diamond Core Drilling Operations



COAL MEN:

When you look over the latest coal mining equipment at the 1955 Coal Show, May 16-19, in the Public Auditorium in Cleveland, *be sure not to overlook the important part electric wires and cables play in your mines and preparation plants.*

Examine the display in Simplex Booth No. 1411, and see how and why *Simplex Cords and Cables help you with dependable power.*

Ask the Simplex engineers on duty at the booth to offer solutions to your cord and cable problems.

★ ★ ★

Even if you don't have any questions about cords and cables, drop in at the Simplex booth. Take a breather there.

★ ★ ★

Remember to reserve May 16 to May 19 for the Show.

And don't forget your Simplex friends at Booth No. 1411. They'll want to see you.

Simplex

WIRES & CABLES

SIMPLEX WIRE & CABLE CO., 79 Sidney St., Cambridge 39, Mass.

acf

"Load Support"

MINE CAR WHEELS



Cross Section of ACF "Load Support" Mine Car Wheel showing: (1) uniform depth of hardening, (2) extra heavy overhang, and (3) support at center of tread.

Cost you less per tonnage-mile

New **ACF** "Load Support" Mine Car Wheels are perfectly round when you install them... and *stay round* after long, grueling service! Treads are **QUICK CHILLED** into a hard, abrasive-resistant surface and then **GROUND CONCENTRIC TO THE AXLE** to prevent "flats" and "load lifting". And because new type curved plates give treads **FULL SUPPORT AT CENTER OF LOADING**, tread "splitting" is practically eliminated. Overhang "break-offs" are eliminated also, due to extra metal reinforcement.

Although costs are competitive with ordinary wheels, New "Load Support" Mine Car Wheels result in fewer replacements... fewer work stoppages... long-lasting "roundness" that takes less power. They are available in 12", 14" and 16" sizes. These new wheels can really save you money... just like *any* **ACF** replacement part for your mine cars. Get the latest facts from your nearby **ACF** Representative. **ACF** Industries, Incorporated, New York • Chicago • Cleveland • Philadelphia • Washington • St. Louis • San Francisco • Berwick, Pa. • Huntington, W. Va.

See you at the Coal Show CLEVELAND AUDITORIUM, May 16-19, Booth 1523

acf MINE CARS

for Constant Haulage

**SEE THE
REVOLUTIONARY
NEW PRINCIPLE
FOR SCREENING
AT THE
COAL SHOW**

hi **G**

BOOTH 700
CLEVELAND
COAL SHOW

Hewitt-Robins
INCORPORATED



STAMFORD, CONN.



The Price Alone of CRD one-use bits can lower your drilling costs

...and they are made and backed by **CLEVELAND Rock Drill**

How do Cleveland CRD one-use bits save you money? It's just plain economics. You see, the price of CRD bits on an average, is less than one-half that of a multi-use bit. In fact, the price of a CRD bit comes close to matching the cost of reconditioning a multi-use bit.

So the price alone of CRD one-use bits can help you cut your drilling costs. But there are other reasons to use CRD bits, too.

Faster Drilling Speed — Special offset gauge feature, which permits the use of thinner wings and a steeper reaming angle, greatly reduces binding and provides ample clearance for cuttings. Result is a free, fast-cutting, chiseling action that gives you greater drilling speed.

Less Drill-Steel Breakage — The method of attachment used with the CRD bit eliminates threads on the drill rod. Since a drill rod is only as strong as the root

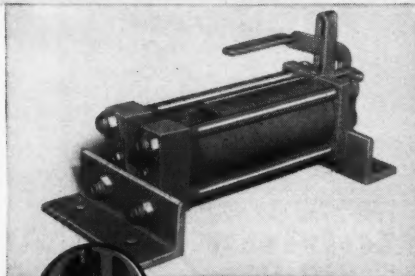
diameters of its threads, the tapered threadless CRD design provides longer drill-steel life — reduces drill-steel handling and reconditioning costs.

Lower Rock Drill Repair Costs — Because the CRD bit design reduces binding in the hole, there is less strain on the rotation parts of your rock drills. Rifle bars, rifle nuts, and chucks last longer. You get more drilling done at lower cost.

Since no special equipment is needed for reconditioning bits or threading rods, you owe it to yourself to try a can of CRD bits. They're ideal for roof bolting and for use in your stopes as well as in your headings. A short trial will give you first-hand information on the ability of these bits to cut drilling costs in your property, as they have in so many others.

Bulletin RD-29 gives detailed information. A copy is yours for the asking — just write for it.

Pneumatic knock-off machine makes it still easier and quicker to use CRD bits. Hand knock-off tools also available.



CLEVELAND ROCK DRILL DIVISION
Westinghouse Air Brake Co.

S P E C I F I C A T I O N S

Mines everywhere cut drilling costs with CRD DETACHABLE DRILL BITS
4-Wing Type — Center Hole — Side Hole

Series "A" Bits For series "A" drill steel connection on any steel. Best suited to 3/8" steel.	1 1/4" 1 3/8" 1 1/2" 1 5/8" 1 3/4" 1 7/8" 2"	Aluminum Pink Deep Green Brown Grey Maroon Deep Blue	Series "B" Bits For series "B" drill steel connection on any steel. Best suited to 1", 1 1/8", and 1 1/4" steel.	1 1/8" 1 1/2" 1 3/4" 1 5/8" 1 3/4" 1 7/8" 2" 2 1/8" 2 1/4"	Orange Green Yellow White Black Red Blue Tan Plain Pink Maroon Aluminum

Cans are labeled showing size of steel socket, gauge of bit, and color.

12500 BEREA ROAD
CLEVELAND 11, OHIO

RD-60

NEW
RED SADDLE
 shuttle car cable
 lasts 4 times as long*



Take the average life of the shuttle car cable you're now using. Multiply it by four. And you get the *minimum expected life* of the new Hazacord Red Saddle Hex-Tite Twin for shuttle car service.

The reasons for this greatly increased life expectancy? Look at the red portion of the illustration—that's a *pre-formed* protective wall of red neoprene which assures a uniformly thick fill between conductors . . . gives added security against short circuiting due to run-overs by heavy equipment . . . locks Hex-Tite conductors in place to prevent internal slippage.



Now available to the mining industry for the first time, Red Saddle has all the other features that have made Hazacords first choice for rugged shuttle car service:

1. Hex-Tite non-slipping construction for longer life.
2. Compensated stranding to prevent opening-up of conductor strands when flexed.
3. Strong, resilient, heat-resisting insulation.
4. Tough, flame-proof, moisture and abrasion-resistant sheath.
5. Shaped conductors locked in place by solid sheath.
6. Extra flexibility for high-speed reeling.

* Actual tests on the special testing machine developed by Hazard engineers to simulate the pulling, twisting and bending of the severest mining machine service showed the new Red Saddle Type G Twin withstood more than four times the test cycles of old style Twin Type G.

And Type G Red Saddle Twins have a special *round* ground instead of the old-fashioned flat type. This exclusive design provides maximum protection between ground wire and power conductors, adds flexibility to the cable, markedly reduces ground wire breakage and consequent cable failures.

For full details on the new Hazacord Red Saddle Hex-Tite Twin, see your Hazard representative or write to Hazard Insulated Wire Works, Division of The Okonite Company, Passaic, N. J.



Trade-Mark applied for.

2723

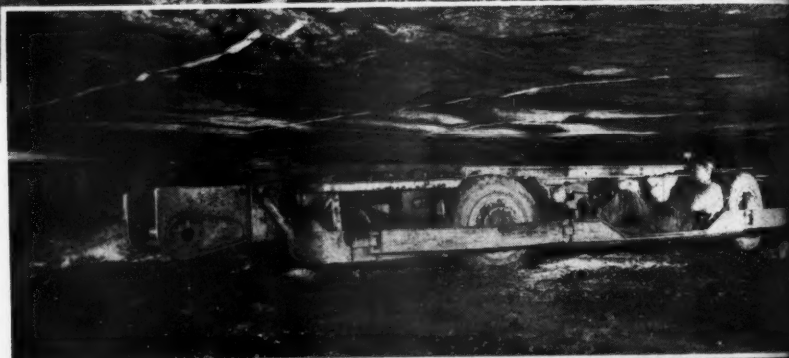
JOY



20-BU LOADER 

8-SC SHUTTLE CAR 

12-RB CUTTER 



"12-20-8" COMBINATION

AVERAGES 950 TONS A DAY (2 SHIFTS)

HERE'S the typical operating performance of a Joy low-vein equipment team, recorded during a recent three-month period.

Two 12-RB rubber-tired cutters, two 20-BU loaders and four 8-SC shuttle cars, operating in a West Virginia mine on a "two-working, one-off" shift basis, are producing an average of 950 tons of coal every day . . . and have reached peaks of 1200 tons per day.

The mine is operating in the Peerless Seam, in coal that varies in height from 35" to 37". A channel sample shows analysis of 3% ash, 1% sulphur. The bottom is fire-clay, and the top is normally very hard slate, but there is a draw slate varying from 1" to 3" in thickness that comes with the coal. This draw slate is not picked before the loading operation underground, but is removed by a man at the outside and near the belt head piece. Main haulage consists of two Joy MTB-30 belt conveyors, 1000 and 2600 feet long respectively.

The total number of men on the payroll is 55 on three shifts, with the third shift consisting of five men on equipment-greasing and supply duties. Production per man-day therefore varied from 17.3 tons average to 21.8 tons at the peak—a highly favorable rate in 36" coal.

In every coal-producing area and under all seam conditions, Joy mining equipment is setting the records for low-cost, high-production operation. Let us work with you. *Joy Manufacturing Company, Oliver Building, Pittsburgh 22, Pa.* In Canada: *Joy Manufacturing Company (Canada) Limited, Galt, Ontario.*



Consult a Joy Engineer

W&O CL5449

12-RB CUTTER

A rubber tire-mounted, mobile cutting machine only 26" high, supplied either as a bottom cutter or top cutter. Hydraulic tramming, steering and controls, with hydraulic pump driven by a separate motor. Ample capacity to keep out in front of the loader.

20-BU LOADER

Over-all height is only 24", yet maximum capacity is 8 tons per minute. Employs the exclusive Joy loading principle. Gathering arms and conveyor are independently driven. Has swinging tail conveyor, individual crawler-tread drive, and exclusive Magnetax control.

8-SC SHUTTLE CAR

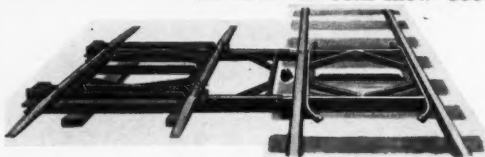
Rubber tire-mounted, highly flexible and maneuverable. Only 26" in height, with a level capacity of 2 tons, the 8-SC has four-wheel positive drive, four-wheel hydraulic steering, and four-wheel Joy single-disc brakes—also hydraulically-driven cable reel and hydraulically-adjustable elevating discharge.

JOY

WORLD'S LARGEST MANUFACTURER OF
UNDERGROUND MINING EQUIPMENT

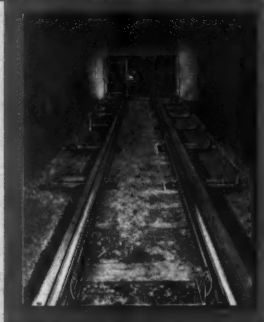
Quickly Self-Liquidating

SEE US AT THE COAL SHOW—BOOTH 1010



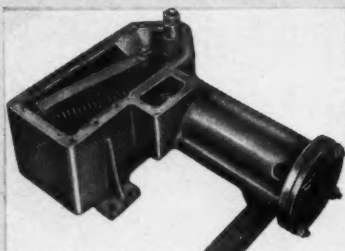
THE FAMOUS "CANTON" AUTOMATIC MINE DOOR

The American Mine Door long ago eliminated trapper boys . . . saved countless lives . . . maintains trip speeds that increase output by thousands of tons . . . saves cash in electrical cost stopping and starting trips . . . snaps open and snaps shut.



"CANTON" CAR TRANSFER

Loads entire train on a single track. No alterations whatever to the main track. Less rib to shoot than for jump switch. No hazards of cherry picker. Car always on wheels.



"CANTON" ELECTRI-THROW—DEPENDABLE SWITCH THROW

Throws switches automatically. No more hazards of men jumping off and on moving trips. Full trains go through at full speed. More tons of coal taken out, more profit per shift.



MODEL 30 TRACK CLEANER

Specially designed for low coal. Quick acting hydraulic adjusting, speeds up track cleaning. American Mine Door Company tailors the machine for 24" to 48" track gauge, and from 30" up in height.



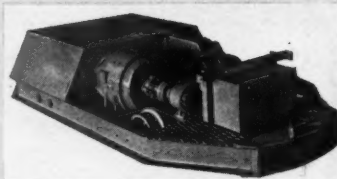
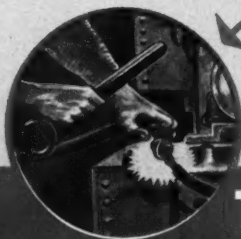
THE RUGGED "CANTON" MODEL 40 TRACK CLEANER

Tailored to your mine from 40" up in height. Removing 100 tons combustible spillage saves buying and applying up to 200 tons of rock dust. The "Canton" Track Cleaners save hundreds of dollars per mile in track cleaning costs. Pay for themselves in exceedingly short time. Clean all mines, hard and soft coal mines, iron and copper, potash and salt mines.



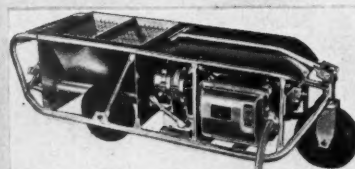
"CANTON" QUICK-ON CABLE SPLICER

Reduce down time. Just pound around joined meshed ends of cable and go on working. No special tools required. A coupling pin or hammer will do. For neat non-sag joint, use Canton Cable Splicers and Canton Shop Vulcanizers.



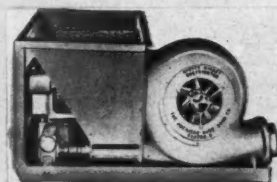
THE "CANTON" DUSTMASTER

A powerful machine equipped with a 20 H.P. motor that will distribute 125 lbs. of dust per minute through 500 ft. of hose. Rigidly built. Minimum height from rail 25". Track mounted.



THE "CANTON" LITTLE CHIEF

Will dust anywhere. High pressure machine dusting through 1 3/4" hose . . . up to 250 ft. Big capacity. Skid model for shuttle buggies, belts, or mine cars, also rubber tire model. Track mounted for haulage roads. Height 18" on skids, 22 1/2" on tires.



THE "CANTON" MIGHTY MIDGET

Portable, weighs 280 lbs.—quickly moved from face to face to dust rooms as soon as loading machine departs. Ideal for small mines or dusty locations. Capacity 7 tons per shift. Inexpensive. Can be cart mounted.

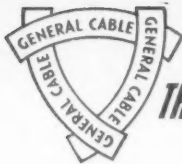
THE AMERICAN MINE DOOR COMPANY

2063 DUEBER AVE.

CANTON 6, OHIO

Let us install a "Canton" product for you.

Pay us out of savings.



THE GREATEST NAME IN ELECTRICAL WIRE AND CABLE

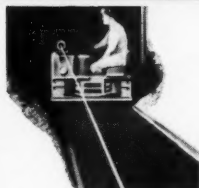
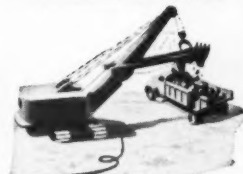
*resists all
hazards
far beyond
accepted field
requirements*

CRUSH RESISTANCE

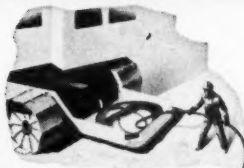


TEAR RESISTANCE

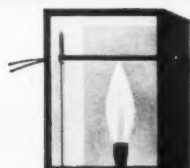
ABRASION RESISTANCE



FLEXING ENDURANCE



RESISTANCE TO KINKING



FLAME AND HEAT RESISTANCE

SUPER SERVICE

Heavy Duty Mold-Cured Portable Cords and Cables

Constant research . . . both in our laboratories and in the field . . . keeps SUPER SERVICE ahead of your most severe applications.

Result: longer cable life, fewer work stoppages, and improved safety!

For example, the SUPERTUF neoprene jacket on new SUPER SERVICE resists sleeving, crushing, tearing, abrasion, oil and flame . . . specially reinforced for extra tensile strength.

New THERMAX heat-resistant insulation gives

top protection against temporary current overloads.

Combined with extra features such as compact design to reduce sleeving of jacket from core . . . it's no wonder that SUPER SERVICE has become a byword for dependability.

In mining operations everywhere . . . day after day . . . SUPER SERVICE is keeping in check all the costliest hazards. Why settle for less? See your friendly General Cable Representative today!

GENERAL CABLE CORPORATION



BARE, WEATHERPROOF, INSULATED WIRES and CABLES FOR EVERY ELECTRICAL PURPOSE

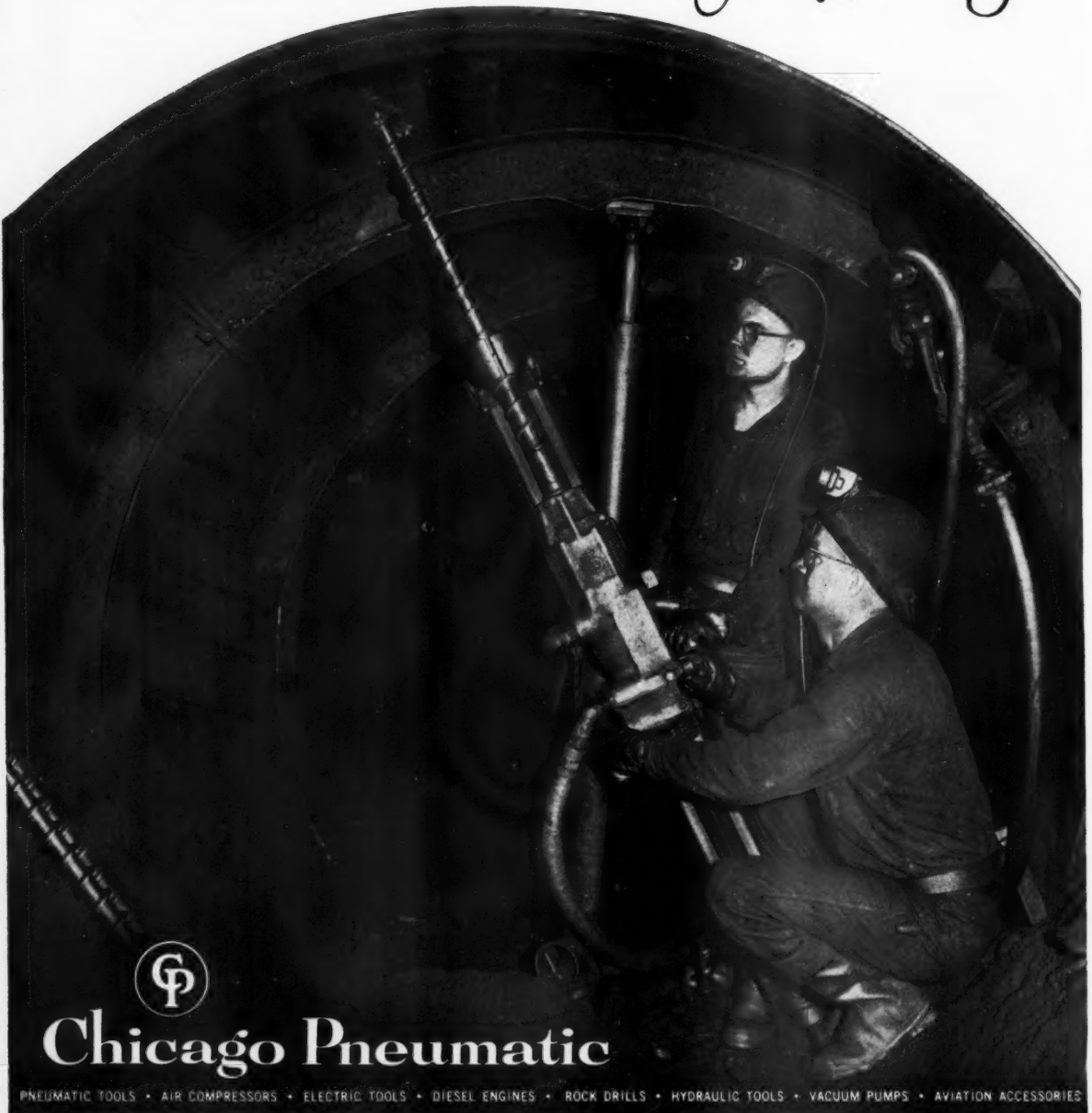
GENERAL CABLE CORPORATION


Executive Offices: 420 Lexington Ave., New York 17, N. Y.

SALES OFFICES: Atlanta • Baltimore • Boston • Buffalo • Chicago • Cincinnati • Cleveland • Dallas • Denver • Detroit • Erie (Pa.) • Greensboro (N. C.) • Houston • Indianapolis • Kansas City • Lincoln (Neb.) • Los Angeles • Memphis • Milwaukee • Minneapolis • New Haven • Newark (N. J.) • New York • Philadelphia • Pittsburgh • Portland (Ore.) • Richmond (Va.) • Rochester (N. Y.) • Rome (N. Y.) • St. Louis • San Francisco • Seattle • Springfield (Ill.) • Syracuse • Tampa • Tulsa • Washington, D. C.

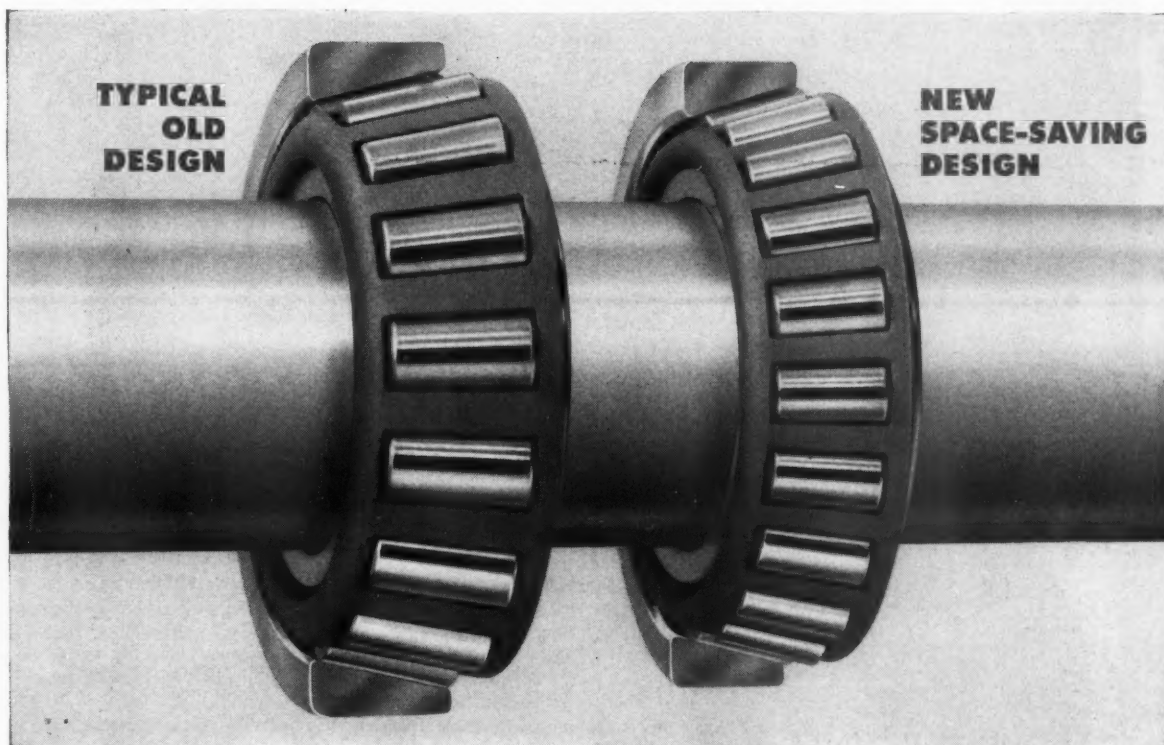
It's the new CP-555 Rotauger! Ideal for close-quarter work because of its short overall length, the CP-555 combines two important features in one compact machine. It not only has a fast and powerful rotary drill . . . but it also has an entirely independent rotary motor feed to put the operator in complete control at all times. And talk about speed! The CP-555 can double your footage in softer formations . . . drills 2½ inch holes in speeds of 2 to 4 feet per minute in depths of 100 or more feet. For more detailed information write *Chicago Pneumatic Tool Company, 8 East 44th Street, N. Y. 17, N. Y.*

it's The Last Word in Drilling Efficiency...




Chicago Pneumatic
PNEUMATIC TOOLS • AIR COMPRESSORS • ELECTRIC TOOLS • DIESEL ENGINES • ROCK DRILLS • HYDRAULIC TOOLS • VACUUM PUMPS • AVIATION ACCESSORIES

New capacity-packed TIMKEN® bearings for conveyor idlers cost less, weigh less, take less space



New design in 3/4" and 1 1/4" bore sizes offers new economies

TWO new Timken® roller bearings offer you an opportunity to cut the cost of bearing applications in heavy-duty conveyor idlers, as well as other applications where bearings with 3/4" and 1 1/4" bore sizes are required.

The new Timken bearings cost less because they are substantially reduced in width and outside diameter compared to previous designs with the same bore sizes. The new bearings make possible other savings as well, since bearing housings can be made smaller, and smaller seals can be used. And the new bearings are packed with capacity—no other bearings have ever delivered so much capacity in so little space.

The new bearings have already proven themselves. In less than a year, over 1,000,000 of them have been put into use by leading car makers as front wheel bearings and in many other applications.

With the new Timken bearings you'll get all the proven advantages of Timken conveyor idler bearings, but at a lower cost than ever. Timken bearings practically eliminate friction because of 1) geometric design for true rolling motion, and 2) accurate manufacture that lives up to the design.

Full line contact between rollers and races gives Timken bearings the high load capacity you need in conveyor applications. And Timken bearings aren't just lubricated for "life", but lubricated yearly, or as conditions require, to insure long life. Fresh lubricant ends any chance of gummy, sticky, jammed bearings.

If you haven't seen the new Timken bearings, call your Timken Company representative or write: The Timken Roller Bearing Company, Canton 6, Ohio. Canadian plant: St. Thomas, Ont. Cable address: "TIMROSCO".

TIMKEN ... your number 1 bearing VALUE

TRADE-MARK REG. U. S. PAT. OFF.
TAPERED ROLLER BEARINGS

NOT JUST A BALL NOT JUST A ROLLER THE TIMKEN TAPERED ROLLER BEARING TAKES RADIAL AND THRUST LOADS OR ANY COMBINATION



AERODYNE power for deep breathing underground



Inside view (circle) of big AERODYNE "iron lung" shows scientifically-designed torpedo discharge cowling for reducing air turbulence, sharply increasing fan efficiency.

8H60 AERODYNE installation (top view) at Johnstown Coal and Coke Co. Crichton No. 4 Mine, Nettie, W. Va.

Coal mines can take deep breaths with the Jeffrey 8H Series AERODYNE Fan. From 20,000 to 500,000 C.F.M. of air can be blown or exhausted at pressure up to 20" W.G.

Individually adjustable blades enable the 8H to operate over a large range of capacities at peak efficiency. Fan can be readjusted as mine characteristics change or easily disassembled for transportation to another location.

Hundreds of AERODYNES have been installed since the fan was introduced in 1936. It is easily the most popular mine fan in America, because it is both flexible and reliable.

Jeffrey's Fan line also includes:

6F SERIES AERODYNE—a six-blade fan combining economy and efficiency for light or medium-duty ventilation up to 5" W.G.

12A SERIES AERODYNE—a 12-blade, self-contained deluxe fan for heavy duty . . . designed for maximum pressure of 13" W.G. and volumes from 20,000 to 700,000 C.F.M.

AERODYNE JR.—a low-cost fan for general or auxiliary mine ventilation or industrial applications . . . 5,000 to 150,000 C.F.M. up to 4" W.G.

AERODYNE MIDGET BLOWERS, Type 61 Blowers and Universal Blowers for secondary fan duty.

Write for Jeffrey Mine Fan Catalog 797.

JEFFREY ... for continuous mining...see us at the Coal Show

THE JEFFREY MANUFACTURING COMPANY • COLUMBUS 16, OHIO

CHANCE PROCESS

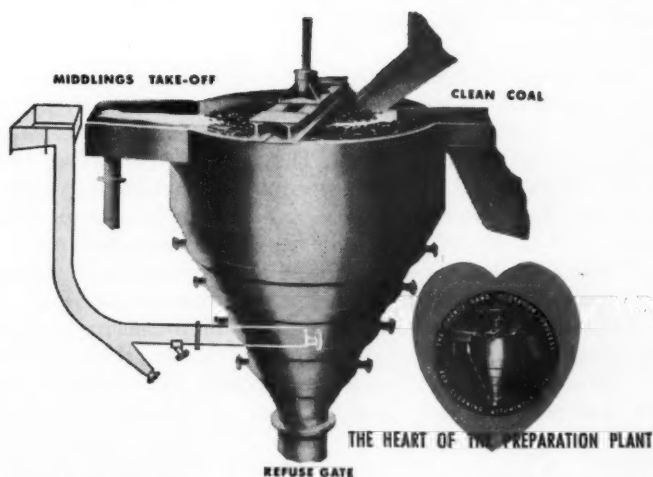
THE ORIGINAL HEAVY-DENSITY COAL CLEANER

3-PRODUCT CHANCE CONE OFFERS ALL THESE FEATURES

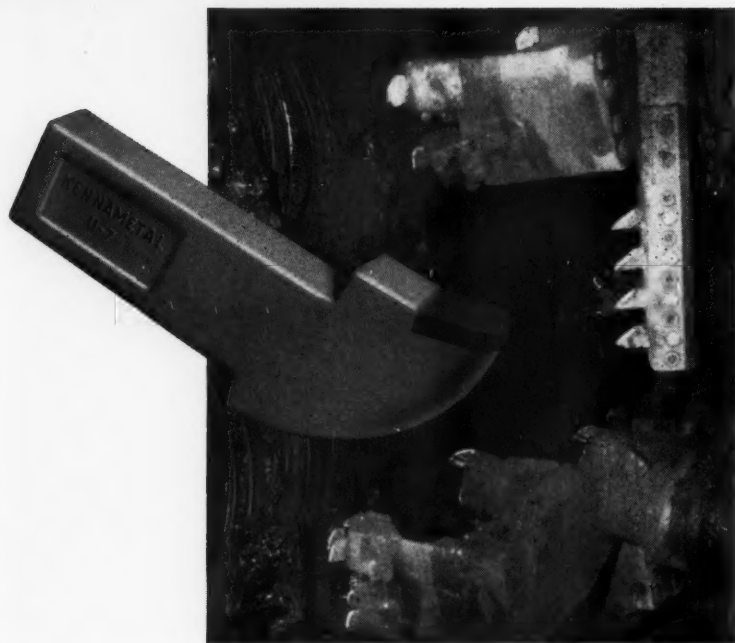
new low maintenance method of elevating refuse
automatic refuse withdrawal
cleans coal down to 1.35 gravity
takes off middlings from 1.35 to 1.70 gravity
over 99% recovery of salable coal
cleans wide range of coal— $\frac{1}{8}$ " to 10"
one-man gravity change-over in 5 minutes
capacities 40 tph to 600 tph

Chance Cones, in use in all the major coal producing countries of the world, are cleaning over 123,000,000 tons of coal annually. Chance Cones produce exceptionally high tonnage of specification coal at lowest cost per ton. Find out more about the IMPROVED Chance Cone. Write for full details today.

The new middlings take-off is optional with new equipment and can be fitted to cones already installed.



UNITED ENGINEERS & CONSTRUCTORS, INC
NEW YORK 17 PHILADELPHIA 5 CHICAGO 2
WITH A BACKGROUND OF OVER SEVENTY YEARS' EXPERIENCE



KENNAMETAL* U-7's help pioneer continuous mining in Indiana

... give 40% lower bit cost at Enoco Collieries

Enoco Collieries No. 5 seam is known as a "toughie" in Indiana. Until recently this six-foot, boulder-ridden measure was considered economically impractical to mine with continuous machines due to high bit cost.

Before continuous mining was a success under these rugged conditions, many grades, types and brands of carbide tools were tested, together with modifications aimed at improving rates of penetration and bit life.

Their lowest bit cost per ton—40 percent lower than that of any other tooling used—was achieved using Kennametal U-7 Bits. These bits had a 20-degree rake angle recommended by Enoco's general superintendent, John Stachura. They increased penetration speeds in solid work up to 15 inches per minute, in recovery work up to 28 inches per minute . . . *an average of better than three inches per minute over speeds achieved with other carbide tools tested.*

A recent operating report showed an average weekly production of 365 tons, or approximately 45 tons per man at the face.

This is not an isolated case. Kennametal is increasing productivity and lowering bit cost per ton wherever it is used. The next time you buy, be sure to specify Kennametal. *It will cost you less in the long run.* KENNAMETAL, INC., Bedford, Pa.



Proper application important

The two bits shown above were originally identical. They were used in the same machine for drilling the same material . . . hard sandstone. Operating at low torque and high rpm, the bit on the right drilled four inches before it was removed. It was not reusable. Compare it with the bit on the left which drilled six feet in this material, but at high torque and low rpm. This bit is just now in need of reconditioning. The difference was in the application of the tools. Your Kennametal representative is a specialist in proper tool application. Let him help you achieve best performance.

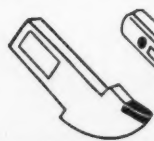


Reconditioning—when and how

Proper bit reconditioning and changing intervals are very important, if not essential, to lowest bit cost. As a guide to setting up procedures for grinding your own tools, or judging if commercial grinding is being done properly, Kennametal offers you a comprehensive, new booklet entitled, "The When and How of Reconditioning Kennametal Bits." Write for a copy.

*Registered Trademark

8724



MACHINE BITS



ROOF BITS



INDUSTRY AND
KENNAMETAL
... Partners in Progress



DRILL BITS



ROCK BITS



Call your shot... then call for American Electric Blasting Caps ... for American makes a cap for every type of blasting

That's right, you call your shot—instantaneous, regular or split-second delay—in coal mines, in quarries or on construction jobs. Then use American Electric Blasting Caps, for American makes the *right* cap to set your shot off dependably and economically.

And American Electric Blasting Caps also offer these positive advantages:

Choice of Delays—10 regular delay periods and 15 split-second delay periods meet virtually every timing requirement.

Timing Accuracy—the finest timing periods are produced for exact planned shooting.

Detonation Strength—more than

enough to detonate most all insensitive dynamites.

Superior Insulation—five separate coats of Organosol insulation give unsurpassed electrical and strength properties.

And they're color coded for fast, sure identification.

The American Line:

High Explosives	Electric Blasting Caps
Permissibles	Instantaneous
Blasting Powder	Regular delay
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If it's American, it's dependable.



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Forged and fortified for the long grind...

Ancient engineering "know-how" built the pyramids to last for the ages. For more than a quarter of a century at Sheffield, metallurgical skills and technological procedures have built up unrivaled "know-how" in the production of hard, tough grinding balls.

The finest of steel is fortified in the furnace with molybdenum, copper and other alloying elements in the precise proportions for deep hardenability. Automatic machines hot forge bars of this time tested alloy into near perfect spheres.

Next and most important, the hot forged Moly-Cop balls are slow cooled, reheated in pyrometrically controlled furnaces to exactly the right temperature for carefully controlled quenching to attain a deep, uniform hardness.

There is no short cut in attaining the finer, denser grain structure of exceptional hardness and toughness necessary for longer and even wear.

Likewise, there is no short cut to grinding economy. If you want the lowest ball cost per unit ground — do what many major mills do—use Moly-Cop grinding balls.

SHEFFIELD



MOLY-COP

COPPER • MOLYBDENUM • ALLOY
GRINDING BALLS

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ARMCO STEEL CORPORATION

SHEFFIELD PLANTS: HOUSTON KANSAS CITY TULSA

Export Representatives: ARMCO INTERNATIONAL CORPORATION • Middletown, Ohio

"EUCS" are PACE-SETTERS for PROFITS

For coal stripping operations Euclid Rear-Dumps and Bottom-Dumps rate high in keeping overburden and coal hauling costs low. Their ability to stay on the job month after month, with less down time for servicing and repairs, has made "Eucs" the first choice of leading mine operators. Have your nearby Euclid dealer make a production and cost estimate for your operation . . . there's no cost or obligation, and there's a good chance that he can show you how to cut your hauling costs.



See the latest models with many new cost-cutting features at the Coal Show in Cleveland. You won't want to miss the big Euclid exhibit in space 1629!



• Rear-Dump Euclids, of 10, 15, 22, 34 and 50 ton capacities, are powered by diesel engines of 125 to 600 h. p. With standard 5 or 10 speed transmission, or with Torqmatic Drive, they have a range of travel speeds up to 36 m. p. h. with full payload. These "Eucs" are unequalled for performance and low operating cost on the toughest jobs. No matter what your off-the-highway hauling requirements may be, there's a Euclid model that can haul more loads per hour at lower cost per ton or yard moved.

• Bottom-Dump Euclid Coal Haulers are designed and built as complete units . . . they have good power-to-weight ratio and proper weight distribution for traction and ease of handling. Short wheel base of tractor and universal hitch design permit short turns and make these big "Eucs" easy to handle. Large single or dual tires on tractor drive and trailer wheels provide good traction and flotation. Powered by 190 to 300 h. p. engines, with 5 or 10 speed standard transmission or with Torqmatic Drive, these Coal Haulers have capacities of 25, 32 and 40 tons.

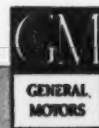


**EUCLID DIVISION GENERAL MOTORS CORPORATION,
Cleveland 17, Ohio**



Euclid Equipment

FOR MOVING EARTH, ROCK, COAL AND ORE



FACTS ABOUT **Exide**[®]

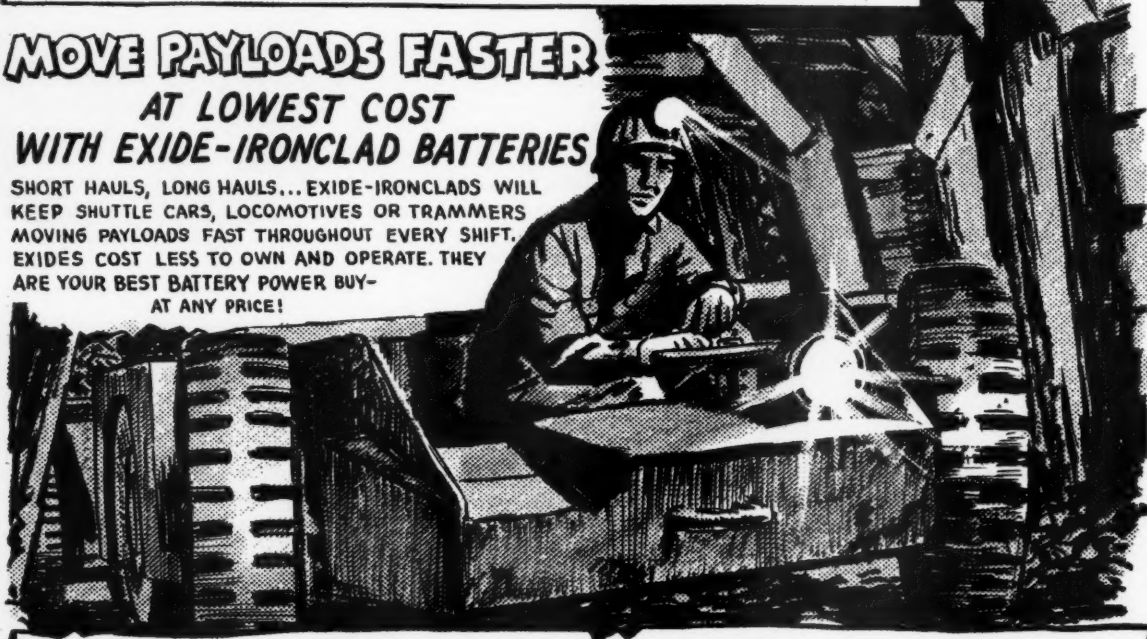
IRONCLAD[®] MINING BATTERIES

MOVE PAYLOADS FASTER

AT LOWEST COST

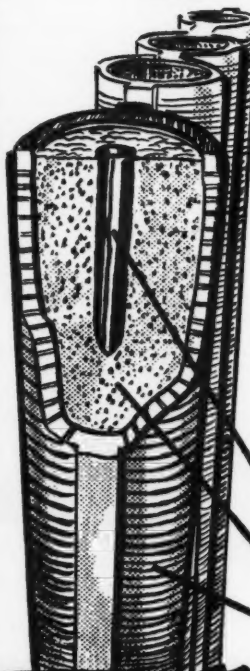
WITH EXIDE-IRONCLAD BATTERIES

SHORT HAULS, LONG HAULS... EXIDE-IRONCLADS WILL KEEP SHUTTLE CARS, LOCOMOTIVES OR TRAMMERS MOVING PAYLOADS FAST THROUGHOUT EVERY SHIFT. EXIDES COST LESS TO OWN AND OPERATE. THEY ARE YOUR BEST BATTERY POWER BUY- AT ANY PRICE!



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SLOTTED TUBES INSIDE AN IRONCLAD KEEP ACTIVE MATERIAL IN FIRM CONTACT WITH CONDUCTING GRIDS OF THE POSITIVE PLATE... THIS GRID PROTECTION LENGTHENS LIFE OF BATTERY. THE SLOTTED TUBES EXPOSE MORE ACTIVE MATERIAL TO THE ELECTROLYTE... FOR GREATER POWER. FINE TUBE SLOTS HOLD MATERIAL IN CONTACT WITH GRID LONGER... RESULT, THE IRONCLAD'S ABILITY TO DO YOUR MINE HAULAGE JOB FOR A LONGER PERIOD OF TIME. THAT IS WHY

**EXIDE-IRONCLADS
ARE YOUR BEST MINING BATTERY BUY-
AT ANY PRICE !**



IRONCLAD POSITIVE PLATE

PROTECTED
CONDUCTING GRID
COMPRESSED
ACTIVE MATERIAL
SLOTTED
RETAINER TUBE

LET EXIDE HELP SOLVE YOUR MINING BATTERY PROBLEMS. ① CALL AN EXIDE SALES ENGINEER FOR FULL DETAILS. ② WRITE FOR FORM 1982, A MANUAL ON MAINTAINING MOTIVE POWER BATTERIES.

Exide INDUSTRIAL DIVISION, The Electric Storage Battery Company, Philadelphia 2, Pa.

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... FOR DEWATERING

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An entirely new screening principle gives the Symons "V" Screen unequalled high capacity for wet or dry applications, especially in the more difficult to screen finer sizes. The screening principle employs controlled diffused feed and vertical flow of material, with a low rotary speed and high speed gyratory action, combining centrifuge and gravitational force.

Numerous Symons "V" Screen dewatering installations have proved that the centrifugal action of this unit produces a much dryer product with less degradation than conventional dewatering methods. *Mail the coupon for further information.*

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SYMONS . . . A REGISTERED NORDBERG TRADEMARK
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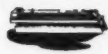


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S155

Visit **CARDOX** at the Coal Show!...

**Booth
2000**

See **NEW
CARDUX
Equipment!**

Hear **How It Will
Help You to Cut Costs!**

● We'll have engineers on hand to tell you of new CARDUX equipment now being introduced — of methods that are boosting profits and efficiency in other progressive mines.

**We'll be looking for you —
BOOTH 2000**

AIRDOX

THE CHEAPEST MEANS KNOWN FOR FACE PREPARATION

New **semi-portable
AIRDOX model
will be shown**

New models and designs now give AIRDOX even greater scope — put the cost-cutting advantages of AIRDOX within reach of more mines.



AIRDOX Compressors, part of a complete AIRDOX installation that is "paying off" in better mine operation at lower cost.

Wherever it is in use AIRDOX has proved that it helps to:

- **REDUCE FACE PREPARATION COSTS**
- **INCREASE LOADABILITY**
- **CUT COAL CLEANING COSTS**
- **PROVIDE GREATER SAFETY**
- **PROTECT ROOF AND RIB STRUCTURE**

Get the full facts and evidence at Booth 2000, or write for further information.

CARDOX

Now is the time to put production on a more profitable plan. Let us help you at BOOTH 2000.

CARDOX AUGER MINER

(SURFACE)

drill under overburden
and take high-profit
tonnage from
abandoned seams



Doubly Profitable! This double drilling operation recovers coal at low cost from a thick seam, formerly abandoned.

TWO NEW
CARDOX
AUGER MINER
MODELS

MODEL 235

Drills holes ranging from 36 to 60 inches to a depth of 150 feet or more back from the face of the seam. Powered by Hercules DFXE. Hydraulic walkers for moving unit from hole to hole align augers to an accuracy of 1/2 inch.

Movies of
Technical Details
and Operation
will be shown

DIESEL POWERED MODEL 155 - ON DISPLAY FOR THE FIRST TIME

Powerful rugged Diesel performance and low operating cost!

CARDOX - HARDSOEG VERTICAL DRILLS

- Fast, easy-to-use drills for blast holes
- Drill more holes, in less time at lower cost per hole

See and get the Facts on
the new Tractor Mounted
Model at Booth 2000

Full tractor mobility in a new,
powerful vertical drill. Simpli-
fies and speeds up drilling. One
man can do the job easily.

CARDOX-HARDSOEG Vertical
Drills are available in a range of
standard and heavy duty models,
with gasoline engines or electric
motors.

Get full information and sugges-
tions on lower drilling costs at
Booth 2000 or write for more
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Non-Explosive Mining Methods and Drilling Equipment

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Library, Pennsylvania
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Camden-on-Gauley 2181

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"...has hugged the idlers perfectly, right from the start of operations"

says Supt. of Freeman Mine No. 4 about U. S. Ustex-Nylon Slope Belt



Photo shows U. S. Ustex-Nylon Mine Haul Slope Belt. Notice excellent troughability with perfect alignment.

Look at the facts: A 42" belt, 1,330 feet center to center.
Capacity: 400 tons per hour. Lift: 360 feet. Speed: 300 feet per minute.

"Idler-hugging" troughability, perfect alignment and training result from the quality "U.S." builds into its conveyor belts.

In this highly mechanized up-to-date mine, not only the slope belt but the underground gathering belts and the main haulage belt are all made by United States Rubber Company. The mine operator reports their performance is excellent in every way.

The belts supplied this mine are made of Ustex-Nylon and Cotton-Nylon, the two "U.S." patented developments which provide greater strength and flexibility. For steady, day-in and day-out dependability in conveyor belting, it will pay you to investigate the advantages of "U.S." Three-Way Engineering, in which "U.S." engineers work as a team with the mine engineers and the conveyor system engineers. Write to any of our 27 District Sales Offices, or write to address below.

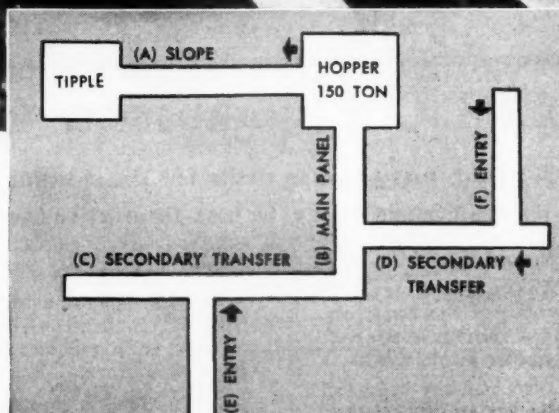


Diagram shows layout of Freeman Mine No. 4

- (A) Slope Belt—42" Ustex Nylon Mine Haul.
- (B) Main Panel Belt—42" Style XN U. S. GIANT Mine Haul.
- (C&D) Secondary Transfer Belts—36" Style XN U. S. GIANT Mine Haul.
- (E&F) Entry Belts—same construction as (C&D).

Visit the "U. S." Booth No. 1215 at the Mining Congress Coal Show in Cleveland, May 16-19.



UNITED STATES RUBBER COMPANY
MECHANICAL GOODS DIVISION • ROCKEFELLER CENTER, NEW YORK 20, N. Y.

Hose • Belting • Expansion Joints • Rubber-to-metal Products • Oil Field Specialties • Plastic Pipe and Fittings • Grinding Wheels • Packings • Tapes
Molded and Extruded Rubber and Plastic Products • Protective Linings and Coatings • Conductive Rubber • Adhesives • Roll Coverings • Mats and Matting

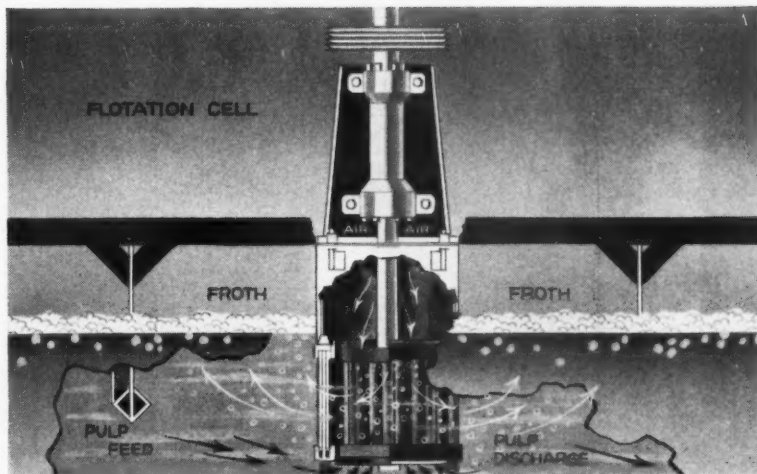
NOW... Cut Froth Flotation Expenses With **GUARTEC**

New Colloid Helps Save on Costly Collecting Agents

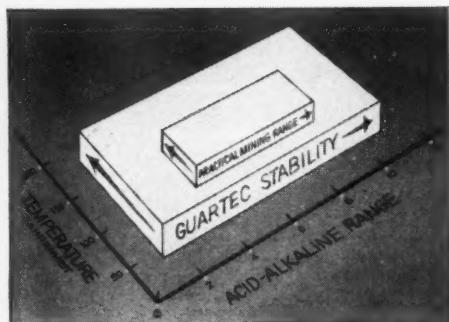
Would you like to trim froth flotation expense? You can, with Guartec—the new General Mills guar gum colloid now available in commercial quantities.

As a blinding agent for froth flotation, Guartec blocks off gangue particles so they can't pick up and adsorb expensive collecting agents. In other words, Guartec enables the collecting agent to concentrate on the material to be floated off.

Usually, just a trace of Guartec is ample for the job. As little as 0.15 to 0.25 pounds (4 to 8 cents) per ton of ore blinds the gangue matter—enabling fast, efficient ore separation with far less collector. Guartec, because of its quick dispersion maintains an effective concentration in the flotation cells at a rapid rate of pulp flow.



You Save Money on expensive collectors when you add Guartec for froth flotation. It gives you 16 to 40% cost savings compared to starches, which have been used for this operation. Operators get fast separation of potash, phosphate, zinc, iron ore—yet add far less reagent.



Guartec Works Well at any practical temperature or acid-alkaline range. It has proved stable for filtering, settling and clarifying in a pH range of 1.2 to 11 and at temperatures of 40 to 180° F.

Try These Other GUARTEC Uses

Guartec also is an excellent flocculant for settling or filtering operations . . . or for clarifying waters and brines.

Guartec has proved its effectiveness in thickeners to "floc" slimes from uranium, zinc, iron ore and manganese. It has clarified brines in potash refining, conserved water for reuse in iron ore processing, and has performed well in many other flocculating jobs.

In just a short time, Guartec has proved successful in ore dressing for many mineral processors. So experiment with Guartec in your operations. See for yourself how it can improve your beneficiation. Send for your free Guartec sample and technical data, today.

For samples, prices and technical information mail this coupon.

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Please send me a sample and further information about Guartec for

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THE NEW RELIANCE
Super T LINE
D-C. MOTOR



RELIANCE ELECTRIC AND
ENGINEERING CO.

1116 IVANHOE ROAD . CLEVELAND 10, OHIO

Canadian Division: Welland, Ontario

The most revolutionary new motor development in 40 years!



***DYNAMIC
RESPONSE**

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Super T—the long-awaited answer to industry's demand for motors that meet the production requirements of today and tomorrow—the age of automation.

Reliance Super T Line D-c. Motors are the result of a new approach to motor design providing higher commutating ability . . . lower mechanical inertia . . . and lower electrical inertia.

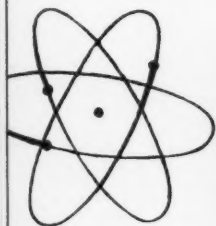
Super T Line D-c. Motors do more in less time—provide Dynamic Response through controlled reaction to the demand for a change in speed or process. Operating as part of the V-S Drive, for instance, it is big and powerful enough to move heavy loads quickly . . . yet fully controllable and gentle enough so that it will not break, stretch, or tear material in process, regardless of gauge or composition.

Bulletin C-2002 will provide you with further details. Call, wire or write your nearest Reliance District Sales Office.

C-1491

Another of the Reliance Tools of Automation

For the world's happiest shovel owners and operators:



P&H

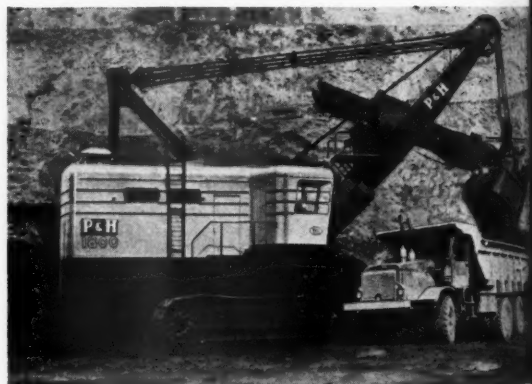


Electronic Control

Step into the new "production office" of the P&H Model Electric Shovels. Look at the control station. Can you imagine anything simpler?

What you can't imagine is the difference it makes with all operating motions electronically controlled. Response is faster, performance characteristics are improved. There's better co-ordination for the operator — and a total absence of physical effort. The new advantages made possible with complete electronic control account for up to 10% more production. And that means lower tonnage costs, of course.

P&H Electronic Control is dependable, thoroughly proved in the field. It now becomes standard on all P&H Electric Shovels — Another example of the way P&H leads the field in Electric Shovel developments. P&H Electric Shovel Division, Harnischfeger Corporation, Milwaukee 46, Wisconsin



P&H Model 1800 Electric Shovel — 8 cubic yard machine

HARNISCHFEGER

AT THE COAL SHOW:

Visit the P&H Exhibit at Space 119. See and operate P&H Electronic Control and Magnetoque® Hoist Unit.

the **P&H** *Line*



TRUCK CRANES



DIESEL ENGINES



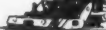
POWER SHOVELS



PREFABRICATED HOMES



HOISTS



SOIL STABILIZERS



WELDING EQUIPMENT

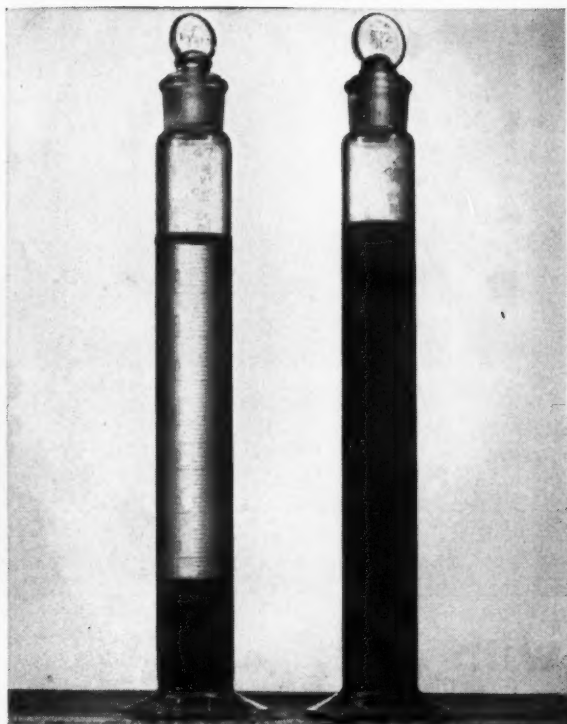


OVERHEAD CRANES



Dow Announces SEPARAN 2610

a superior flocculant



SEPARAN 2610 IMPROVES SETTLING RATE. The cylinder on the right shows untreated ore pulp containing 15% solids. The cylinder on the left containing the same pulp has been treated with .03 lb. SEPARAN 2610 per ton of dry solids. The picture was taken 30 seconds after addition of SEPARAN 2610 and agitation.



SEPARAN 2610 IMPROVES FILTRATION RATE. Filter above shows thin cake formed by untreated material. Filter below shows thick cake collected in the same length of time using SEPARAN 2610. This heavy, porous cake is much lower in moisture than the untreated material.

Under both laboratory and mill conditions, SEPARAN* 2610 has shown the following advantages over other flocculants:

- ★ Stepped up settling rate
- ★ Increased overhead clarity
- ★ Improved filtration rate
- ★ Decreased filter cake moisture
- ★ Increased recovery
- ★ And reduced cost—even as low as 1/10 of a cent per ton of solids.

Prove to yourself the advantages of SEPARAN 2610. Send this coupon in today for your trial sample and literature. THE DOW CHEMICAL COMPANY, Midland, Michigan. *Trademark

THE DOW CHEMICAL COMPANY
Dept. TS 788E, Midland, Michigan

Please send me further information and a trial sample of SEPARAN.

Name

Company

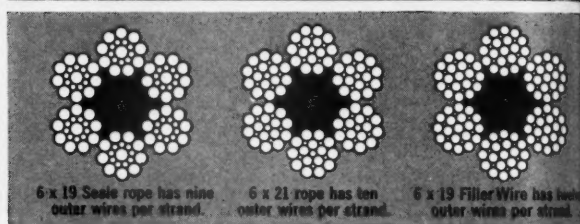
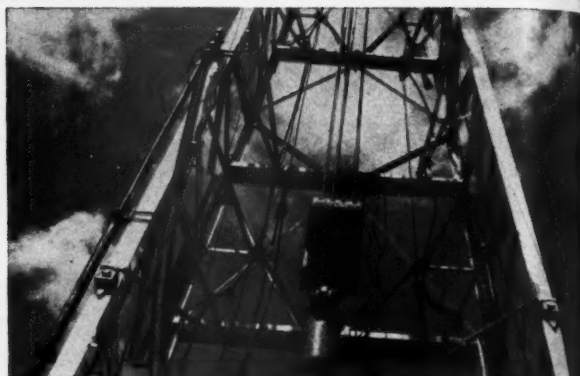
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Mining

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Coal Show Time

EVERY two years the American Mining Congress' Coal Convention and Exposition is held in Cleveland. The 1955 Coal Show takes place May 16 to 19 in that city's huge Public Auditorium.

This year particularly, every progress-minded mining man should attend. The coal industry has plumbed the depths and is now climbing upward. Reliable authorities predict a substantial increase in the amount of coal mined in 1955. The thousands of mining men who come to Cleveland in May will find out how to take advantage of this upward trend. By participating in the convention sessions and studying the latest developments in machinery and equipment in the exhibit halls they will learn how to do a better, safer, more economical job of providing quality fuel to power America and thus improve coal's competitive position.

In a special section of this issue we present a preview of the Coal Show, where those who have faith in the future of this great industry and the determination to battle through to victory will see the way to their goal.

The Trade Agreements Act

THE Trade Agreements Act of 1955 was passed by the House of Representatives on February 18 by a vote of 295 to 110. As this is written, the Senate Committee on Finance is holding hearings on the Act. Howard I. Young, speaking for the American Mining Congress, appeared before the committee to present the views of the mining industry, as set forth in the Declaration of Policy adopted at San Francisco and approved by the Board of Directors (See *MINING CONGRESS JOURNAL*, November 1954, pages 65-66). We hope the Committee will give serious attention to this expression of the mining industry's views.

Worthy of attentive study also is the minority view expressed in the Report of the House Committee on Ways and Means, by Congressmen Daniel A. Reed, Thomas A. Jenkins, Richard M. Simpson and Noah M. Mason.

These gentlemen agree with the statement of President Eisenhower in requesting extension of the

trade agreements authority in his first State of the Union Message, that, "This objective must not ignore legitimate safeguarding of domestic industries, agriculture and labor standards." They agree with the Commission on Foreign Economic Policy which declared that—"American labor should not be subjected to unfair competition as a part of any program to expand our foreign trade."

They do not agree that the proposed Trade Agreements Act of 1955 contains any such provisions or safeguards. As a basic consideration in taking this stand, they recognize that the economic well-being of the non-Communist countries is of vital importance to the security of the free world and further—"A sound and stable economy in the United States is the most vital single factor for a sound world economy. . . . Moreover, a solid United States defense structure, founded upon a strong industrial base, is a prime requisite for peace and security in the world."

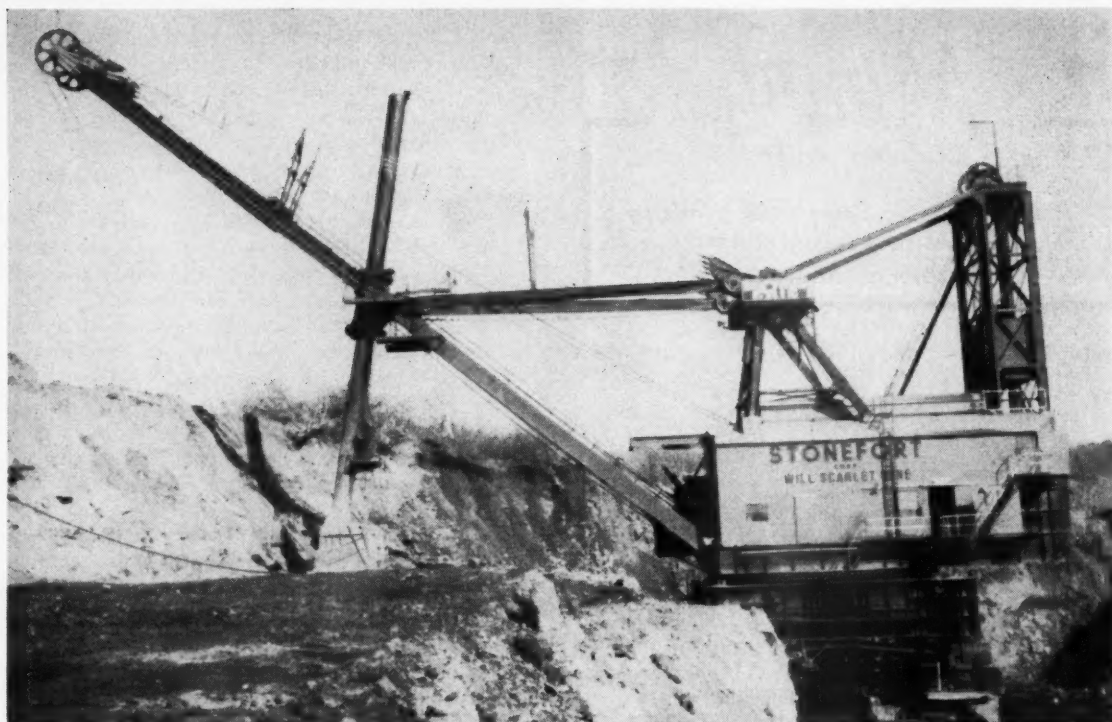
The evidence is overwhelming that the mining industry has been particularly hard hit by the policies which have prevailed under the current Trade Agreements Act. Each month during 1954 an average of 54,904 tons of zinc were imported into this country while our own mines produced only some 38,750 tons. In early 1952 our mines were averaging an output of 60,000 tons per month. Smelter production of new zinc is at an all time high, yet mine output of zinc and lead is at its lowest level since the depression years.

Studies have shown that for every ton of zinc imported in the form of concentrates, loss of employment from tonnage displaced in the Rocky Mountain area amounts to 15 man shifts for mining and milling the zinc ore and smelting the lead and iron concentrates produced in the milling process. To date 10,000 miners and millmen have lost their jobs.

In coal mining the picture is just as bad—excessive imports of foreign residual fuel oil have displaced many millions of tons of coal, and there were some 100,000 fewer coal miners on company payrolls in 1954. In one coal mining county in Pennsylvania 42 percent of all families were living on surplus commodities distributed by the Government. Almost 10 percent of that State's population must depend upon surplus commodities for subsistence.

What is true in the lead-zinc industry and in coal mining is largely true also in the domestic fluorspar industry and among the miners of other strategic and critical minerals inadequately protected from foreign competition.

The myth that lower tariffs and higher imports of metals, minerals and fuels benefit the consumer goods industries in this country fails to recognize the facts. We trust that when all the facts are in the Congress will see that a policy under which reasonable protection is available to maintain a proper mobilization base in the mining industries is in our national self interest, and thus the strongest force possible toward peace and security in the world.



The front end of a Bucyrus-Erie 1050-B shovel was modified to allow stripping two seams from one level

Two-Seam Stripping At Will Scarlet Mine

Several Innovations in Strip Mining Used to Mine Two Southern Illinois Coal Seams. Among Them Is a Belt Conveyor to Take Coal from Pit to Tipple

By WM. W. DUKES

Superintendent
Stonefort Corp.

THE coal mining industry is continually exploring methods to improve production and cut the cost of mining coal. It was with this goal in mind that back in 1950, Mr. R. H. Sherwood's Engineering Department approached the problem of laying out a strip mine in a field of No. 2 and No. 3 coal, locally known as Davis and DeKoven Seams, in Williamson and Saline Counties, Illinois.

These seams were extremely high quality coal for Southern Illinois, but had never been mined on a large commercial basis. The DeKoven, or top coal, averaged three ft in thickness, with a slate band in the cen-

ter, and was overlain by 20 to 50 ft of sandrock and clay. The Davis, or bottom seam, averaged 3 ft 3 in. thick but had no band. The seams were separated by an interval of black slate, shale, and sand rock ranging in thickness from 6 to 17 ft. Because of this separation, these seams had been previously considered uneconomical to strip.

Strip On Two Levels

The first problem attacked was the method of stripping. This, it was decided, would have to be done with one shovel to make the operation

economically feasible. The shovel should work on the lower coal seam, and uncover the top seam by removing the overburden from the side, forming a bench 50 ft wide. As the shovel advanced it would remove the parting between the two seams in the normal stripping manner. Then, by leaving a 20-ft rib of coal on the bottom seam and making 50-ft cuts with the shovel, there would be a 70 ft wide pit of coal on the bottom and a 50-ft bench of coal on the top. However, this could not be done with a standard stripping shovel, so the problem was presented to the Bucyrus-Erie Co. who re-designed their 1050-B shovel to do this job.

The special 1050-B used at Will Scarlet mine has standard machinery, base, and crawlers; however, the boom was lengthened from 113 ft to 133 ft and lowered to a 40° angle. The shipper shaft was moved 20 ft farther out on the boom and the dipper stick was lengthened two ft over standard. This also made it necessary to reduce the bucket size from 36 cu yd to 26 cu yd. With these modifications, the 1050-B can strip the bench from the side with practically the same efficiency as it removes the parting between the two seams from the front. The only disadvantage is the fact that the bucket capacity has been reduced 25 per cent and when digging part of the upper bench, it is necessary to swing 180° to spoil the overburden. However,

these disadvantages are more than off-set by the fact that two seams of coal are uncovered without re-handling any overburden.

Both the overburden above the top vein and the interval between the two veins must be shot. Drilling is done with three self propelled Parcanco Horizontal Drills, with hydraulic feed, powered by Ford Industrial Gas Engines. They drill five-in. holes 46 ft long. These are shot with four in. diameter du Pont No. 401 Dynamite. The drilling and loading on the top seam is done before the coal is removed, however, the drilling and loading on the bottom seam can be done either before or after the loading because a 20-ft rib of coal is left on the bottom next to the high wall. The overburden above the top coal is drilled with holes spaced on 20-ft centers and shot with a ratio of one lb of dynamite to five cu yd of rock. The interval between the two veins is drilled with holes spaced on 25-ft centers and shot with a ratio of one lb of dynamite to seven cu yd of rock.

After finding an economical method of stripping, the next problem was how to operate two separate pits at different elevations behind one stripping unit. Both pits must have the coal removed at approximately the same rate in order to keep the way clear for the stripper to dig. It would take two loading shovels to remove the coal; one on the top seam and the other on the bottom seam. To move trucks on and off of the top seam, it would be necessary to shoot approximately 75 ft of the parting between the two seams and bulldoze a temporary ramp to the lower seam. These ramps should be located so as not to interfere with the loading of the lower coal, and as a general practice, would be made as near the pit



Trucks dump into a semi-portable 50-ton hopper which in turn feeds the belt conveyor

entrance road as possible. For load-Erie 75-B electric loading shovels available. However, with the benching method of stripping, it was felt there were two used Bucyrus—that the electric cables could not be handled satisfactorily. In order to correct this, these machines were converted to diesel electric by installing a Cummins 300-hp diesel engine in the rear of each loading shovel with an auxiliary 110 hp Cummins diesel engine for excitation and to furnish light. This has proved to be a great asset as the loaders can move with more freedom and, particularly on the top vein where room is limited, it has contributed to increased production.

Belt Haulage to Tipple

The third problem was coal haul-

age from pit to preparation plant. Here the Engineering Department considered two alternatives. One was large trucks and the other was smaller trucks from the pit to a semi-portable hopper and belt conveyor from hopper to preparation plant. Although the engineers could find no strip mines that were using belt conveyors for coal haulage, they felt sure that this method was practical as it had been used for several years to haul rock and ore.

Estimated capital expenditure was found to be approximately the same with either large trucks, or with smaller trucks and belt conveyors.

The operation and maintenance estimates indicated that approximately 10 cents a ton could be saved by using the belt conveyors. For one thing, less manpower would be needed as two men could operate the hopper and conveyors while more truck drivers would have to be added as the distance increased from pit to tipple. Also, only four small trucks would be used and their maintenance cost would be less than a fleet of larger trucks. The item of truck roads, too, has always been expensive in strip mining, and all that was necessary for the belt conveyor was a gentle rolling grade. The belt conveyors could always be moved to new locations, while truck roads are not salvageable to any great extent.

With these estimated savings in mind, it was decided to use the smaller trucks and belt conveyor for coal haulage.

Due to the limited width of the top bench, it was necessary for these trucks to have short wheel bases in order to turn around on the top coal. Since plans called for the use of semi-portable hoppers along the belt line, it was felt that rear dump trucks could be used to the best advantage.



Short wheelbase, 22-ton capacity end dump trucks move coal from the pit to the belt. Note the special tail gate which allows greater truck capacity

Modify Truck Body

Here again the manufacturer was consulted on a special design. The Euclid Road Machinery Co. designed a special dump bed to hold 22 tons of coal and mounted it on their Model 46 TD Truck with a 300-hp Cummins NHRS engine. However, when these trucks were placed in service it was possible to load only 17 tons of coal on them because of spillage from the rear lip of the bed. To correct this, R. G. Baughman, general superintendent of Stonefort Corp, designed a tail gate which is pin connected to the sides of the truck bed and remains closed when the bed is in loading position. When the bed is raised the gate is held stationary by cables attached to the truck frame and the rear lip of the bed lowers allowing the coal to be dumped into the hopper in the normal manner. When the bed is again lowered the gate is automatically closed. This device has raised truck capacity up to the 22-ton rating.

Coal trucks haul the coal from the pit to a semi-portable hopper at the belt loading point. This hopper holds 50 tons of raw coal, allowing a small surge for coal delivery from the pit.

Eighty-five lb railroad rails were placed upside down on this hopper with a 12-in. spacing between them in order to trap all large lumps so that they could be broken up before they were loaded on the belt.

It was decided that 2000-ft sections would be the most practical length for the belt conveyor, and at the present time there is one section of this conveyor in operation parallel to the present pit. The belt is a United States Rubber Co. 36-in. 4-ply 42-oz XN Belt with 1/8 in. rubber top cover and 1/16 in. rubber bottom cover. It is carried on five-in. pre-

lubricated idlers made by Transall Inc. of Birmingham, Ala. As a precaution against belt rubbing on the return run, 42-in. return rollers were used instead of the standard 36 in. rollers.

The belt frame is made in 12-ft sections of six-in. channels bolted to channel legs which are in turn spiked to regular railroad ties. Each section has three troughing idlers and one return idler.

There is no deck between the top and bottom run of the belt except for approximately 50 ft at the loading point.

The belt is driven by a 60-hp 1760-rpm motor. It turns at a speed of 400 fpm and carries an average of 500 tph of raw coal to the tippie. Tension is maintained with a horizontal gravity take-up at the head end.

As the pit is worked farther from the tippie the plan is to install additional sections of this belt, keeping the truck haul always less than 3000 ft.

Storage System

Another problem was to provide storage for 5000 tons of raw coal near the preparation plant. This was of major importance as it would assure the tippie of a constant flow of coal even though there were delays in the pit, and would also allow the pit to continue to haul coal when there were delays in the tippie.

After considering several ways to accomplish this storage, it was decided that the best and most economical means was to use an inclined belt to elevate the coal 50 ft above the hopper and build a spiral chute which would lower the coal to the hopper without excess breakage and

also make it possible to pile 5000 tons of coal on top of the hopper.

The incline belt receives the raw coal from the main haulage belt and elevates it to the top of the spiral chute. This conveyor is also a United States Rubber Co. 36-in. 4-ply 42-oz XN Belt, however, it has a breaker strip under the 1/4-in. top cover. It was figured that this was probably necessary due to the fact that the conveyor was only 330 ft long, and therefore each section of belting would carry approximately six times as much coal as an equivalent section of the 2000-ft conveyor. The belt is inclined 16° 48' and has a 14-gauge deck between the top and bottom run.

The spiral chute and supporting structure was designed and fabricated by Robert Holmes and Brothers of Danville, Ill. It cost approximately \$17,000.00 erected, and the first set of spiral plates carried approximately 500,000 tons of raw coal before they were replaced. The second set of plates are now in use and, by welding 2-1/2 by 1/4-in. abrasive bars to the inside of these plates, mine management is confident that they will last at least five or six times longer than the original set.

The stock pile will deliver approximately 2500 tons of coal to the hopper by gravity. The remaining 2500 tons must be fed to the hopper by pushing it with a tractor. This is not particularly expensive as a tractor is not used all the time and whenever it is necessary to push coal a tractor is borrowed from the pit or gob pile for the short time that it is needed.

The preparation plant at Will Scarlet averages 3100 tons of clean coal in a 6-3/4 hr shift. As the rejects average around 18 per cent, it takes an average of 3780 tons of raw coal to feed the tippie. The belt conveyor system can haul approximately 3625 tons in 7-1/4 hr. Therefore, by working the trucks through the noon hour and shutting down the tippie the two are fairly well balanced.

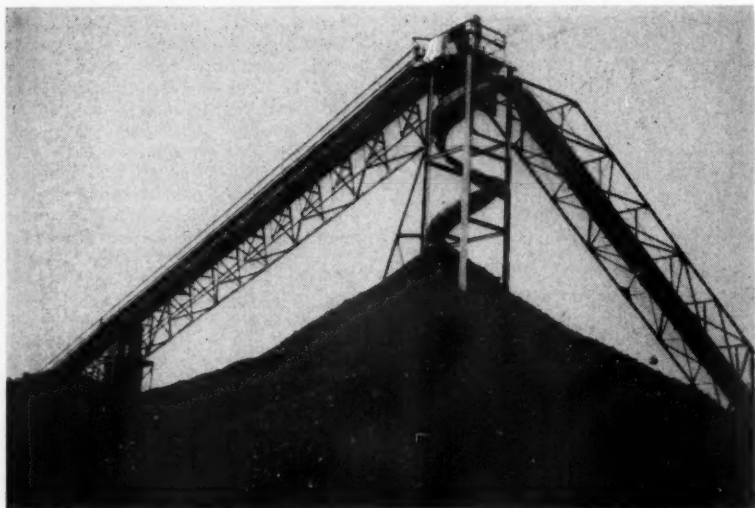
Tippie and Pit Independent

The fact that there is coal in the stock pile allows the tippie on good days to prepare as high as 3600 tons without affecting the pit. This lost tonnage from the pit is either made up on succeeding days when the tippie tonnage is not so high or on an idle day when the tippie is being repaired.

In practice it has been found that it is necessary to stock pile coal one idle day for every 18 working days.

The Will Scarlet Mine has now been in production since April 15, 1954 and considerable experience has been gained with the unusual features of this operation.

The benching method of stripping was new to the operators of the



At the storage pile coal is fed into a spiral chute from the stacker belt and lowered with a minimum of breakage



Head section of overland belt showing horizontal take-up

1050-B and removing the overburden from the bench required some change in their operating technique. However, they soon adjusted to this condition and the 1050-B is now moving approximately 24,000 cu yds of overburden per day. With the favorable ratio, ranging from 6 to 1, 10 to 1, gained by uncovering two seams of coal at one time, the 1050-B has been able to uncover enough coal for the tipples to produce an average of 55,692 tons per month for the last eight months. The biggest single month's shipment of coal was in February 1955, which amounted to 70,891 tons, showing as is to be expected, a gradual increase in production which naturally comes with experience.

Management has found that the operation of the two pits at different elevations require considerable more attention to timing and coordination of the loaders and drills, than in an ordinary strip pit. This is particularly true when the 1050-B reaches the end of a cut. There are two pits instead of one that must have the coal removed and the overburden drilled and shot before the stripping can be resumed.

Belt Slippage Controlled

The only major trouble encountered with the conveyor system has been slippage between the belt and head pulley of both the overland and stacker belt during rainy and icy weather. The stacker belt was the first to give trouble. It would slip whenever there was a hard rain. This trouble was eliminated entirely by covering the belt with a corrugated steel cover. The overland belt did not give any trouble until freezing weather. Then the frost would form on the under side of the belt, causing it to slip on the head pulley. This was temporarily corrected by placing a rubber

scraper on the under side of the belt next to the take-up at the head section. Then, by using a portable truck heater to blow hot air on the head pulley and running the belt empty for $\frac{1}{4}$ of an hour before hoist time, the hot air would loosen the frost on the belt and the scraper would remove it before it froze again. Sometimes it was also necessary to partially load the belt for a short period of time to help melt the frost sufficiently for the scraper to completely clear the belt. However, it was noticed that the cover on the stacker belt keeps frost from forming on the rubber belting, so it is felt that the best solution to this problem would be to cover the overland belt. This will probably be done before the next winter season.

There are several other advantages to covering the belt. A cover would protect the rubber from the sun, keep snow and rain from collecting on the top run, and eliminates the danger of wind whipping the empty belt off the idlers. Although no trouble has been encountered with wind on the overland belt, because it runs between two spoil banks, the wind did cause some trouble with the stacker belt before it was covered.

Maintenance on the belt conveyor system has been very low. Only a few small cuts have occurred on the belt which were vulcanized by the mine force with a patch vulcanizer, and only five troughing rollers and one return roller have been replaced. These rollers did not stop rolling, but began to make a noise and when they were removed it was found that the bearings were loose on the shafts. The grease seals were still intact, however. This belt system has over 2000 rollers and it is felt that a failure of only 0.3 of one percent of these rollers in a year is good service.

However, it will take additional time to accurately rate the serviceability of these prelubricated idlers.

In order to protect the belts the whole system is wired in sequence with centrifugal switches so that if one belt slows down it will stop every thing that feeds coal to it. A two-wire low voltage control is hung along the entire length of the belts that will stop or start the belt at any location if pressed together.

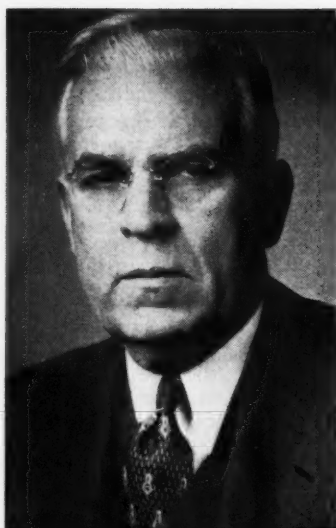
The 5000-ton stock pile has contributed a great deal to the operation of the mine. It has allowed the pit and tipples to operate without the close dependency on each other that is necessary in the ordinary stripping operation. This has enabled the maintenance of a far better daily tonnage through the tipples and has made the whole mining operation more efficient.

There are 101 men employed at the mine—which includes 85 men engaged in coal production only, and 16 company men comprising the supervisory force, engineers, mine clerks, prospect drillers, and laboratory technicians. The mine productivity rate, as figured by the Bureau of Mines formula, which includes only men employed in actual production of coal, and excludes the company men, has averaged 31.4 tons per man day for the last eight months. The largest productivity rate for any one month was 34.5 tons per man day, and was achieved in February 1955.

Experience so far has borne out the engineer's estimates of economy in operation and, although nothing of a revolutionary nature has been done at Will Scarlet, management does feel that a forward step has been made in the strip mine production of coal.



"Son . . . All that I am today, I owe to my dear old father. He taught me to work hard, save my money . . . and he gave me this business."



L. C. CAMPBELL
Vice-President
Eastern Gas & Fuel Associates
Chairman, Coal Division



HUGH B. LEE
President
Maumee Collieries Co.
Chairman, Program Committee



J. W. OVERSTREET
President
National Electric Coal Co.
Chairman, Manufacturing Division

Cleveland Awaits Coal Show

Lakeshore City Ready for Record Influx As Mining People Move Toward Public Auditorium

FROM May 16 to 19 the Cleveland Public Auditorium will be the scene of the 1955 Coal Show of the American Mining Congress. More than 10,000 mining men and ladies are expected to take part in this exciting event. Representatives from coal, metal and industrial minerals fields are coming from every part of North America, from Europe, from South America and even further afield to participate in the convention sessions, to see the displays of all the latest innovations in coal mining and cleaning equipment and supplies and to enjoy the social life for which these conventions are justly famous.

Emphasis in the convention papers will be on improved methods and equipment to help lower production costs and obtain greater efficiency in the production of quality coal to

meet present and future requirements, including the rising demands of the country's ever-growing steel, electric utilities and chemical industries. In the exhibition halls the manufacturers and suppliers to the coal industry will display every type of equipment needed to attain these ends.

Comprehensive Program Set

Under the leadership of its chairman, Hugh B. Lee, president, Maumee Collieries Co., an energetic and effective National Program Committee has arranged an outstanding program. Leaders in their respective fields of coal mining and preparation, management, labor relations and safety have prepared a full program of papers presenting the latest and best ideas in the industry.

Convention sessions on topics of general

interest and on deep mining will be held in the morning. Special sessions on strip mining will be held on Tuesday and Wednesday afternoons and on Thursday afternoon a panel discussion on accident prevention in coal mines will be the center of attention.

Opening session of the convention on Monday, May 16, will deal with continuous mining. On Tuesday morning one session will be concerned with mechanical mining under various conditions and with maintenance cost accounting from the operating officials' viewpoint. Another session will deal with roof support, pillar extraction and control of "mountain bumps."

The first strip mining session on Tuesday afternoon will feature a paper on two-seam stripping, another on Truax-Traer's wheel excavator and a panel discussion on improved truck design.

On Wednesday morning there will again be two sessions. One will deal with foremanship, maintenance and cost control, the other with underground haulage and power. Particular emphasis in this session will be given to various types of haulage equipment as related to mechanical loading. Wednesday afternoon's strip mining session is concerned with drilling



JULIAN D. CONOVER
Executive Vice-President and Secretary
American Mining Congress

HOWARD I. YOUNG
President
American Zinc, Lead & Smelting Co.
President, American Mining Congress

and blasting of overburden and the application of auger mining between the highwall and deep mining areas.

Of the two sessions on Thursday morning, one will deal with continuous mining in low coal and in pillar recovery. A special feature will be a symposium on service haulage. Another paper will describe continuous mining with a-c power. The second Thursday morning session will cover preparation, stressing methods of treating small sizes under four sets of conditions.

Thursday afternoon's session on Safety will present a panel of experts on the subject who



will discuss the cause and prevention of specific hazards in coal mining.

Details of all these sessions are given in the Final Program on pages 60 to 63.

Exposition Tops

More than 225 manufacturers of machinery and suppliers of tools and equipment for modern mining have put forth their very best efforts to provide convention visitors with the most impressive exposition ever staged.

The brief descriptions of the exhibits on pages 67 to 77 can give only a hint of what lies

Many of the units on display will be introduced to the industry for the first time at Cleveland. Trained engineers and technicians will man the exhibits. Happy to discuss the products on display and answer questions about their application to the particular problems of the visitor, their presence makes this an unparalleled opportunity for a rounded out education in modern mechanical coal mining and preparation.

The lessons to be learned at the AMC Coal Show are not limited to coal mining. Each

Session Chairmen



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Joanne Coal Co.



Birch Brooks
Viking Coal Corp.



James Hyslop
Hanna Coal Div.,
Pittsburgh Consolidation
Coal Co.



C. O. Kane
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D. L. McElroy
Pittsburgh Consolidation
Coal Co.



W. J. Skewes
Pocahontas Fuel
Co., Inc.



E. C. Weichel
Hudson Coal Co.

in store for mining men at the 1955 Coal Show. The displays will include everything for economical, safe mining of coal, from tiny electronic devices to huge trucks and power shovels. The list of exhibitors reads like Who's Who in Manufacturers for Mining.

Some exhibits will feature full size machines in operation. At others the center of attraction will be an operating scale model. All will demonstrate products or services vital to the successful operation of a coal mine or cleaning plant.

year metal mining companies and industrial minerals producers send more men to the Cleveland Exposition. Each year more of the modern methods, machinery and ideas developed for coal find wider application in other branches of the mining industry. More and more metal miners and industrial minerals men are finding that they just can't afford not to send key operating men and management executives to see what's new in Cleveland. They have found, as the coal industry found long

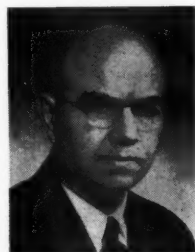
ago, that attendance pays off in new ideas, renewed enthusiasm and lowered costs.

Entertainment Plans

Mining men and their ladies too are ready, after days spent in the meeting rooms and exhibit halls, for fun and relaxation. The big event this year will be the Coal Miners Party on Wednesday evening, May 18. A world of fun and good fellowship will be concentrated in this grand evening. Held at two hotels, to accommodate the crowd, there will be dinner, dancing, music and a really smash-hit floor show. All places are reserved so reservations should be made early.

Monday, Tuesday and Thursday evenings will be left free for impromptu parties, for visiting old friends and for making new ones. Many Coal Show visitors will want to go "on the town" on one of these nights.

For them Cleveland has lots to offer in the way of restaurants, night clubs and athletic events.



L. O. Millard
Chairman,
Welcoming Committee

Those to whom a night at the theater appeals can choose on Tuesday and Thursday from

(Continued on page 63)



E. R. Price
Chairman,
Floor Committee

Program Committee

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Don Johnston Northern Illinois Coal Corp.	L. J. Walker Chicago Pneumatic Tool Co.
K. L. Kenneth Consulting Engineer	E. C. Welch Hudson Coal Co.
J. S. Laird Gay Mining Co.	J. Wm. Wetter Rockhill Coal Co.
Stirling S. Lanier, Jr. Norton Coal Corp.	J. W. Woerner J. W. Woerner & Associates
J. A. Long Long Co.	Guy V. Woody Allegheny Mining Co.
G. P. Mahood Bethlehem Steel Co.	
Wm. C. McCulloch Roberts & Schneider Co.	



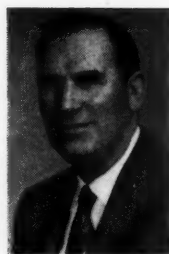
K. L. Konnerth



F. Earle Snarr



Wm. E. Hess



R. J. Bowen



A. H. Mandt



G. A. Schnee



Ralph W. Hatch



E. M. Thomas



E. H. Greenwald

Convention PROGRAM

Monday—May 16

9:45 A. M.—PRE-SESSION MOTION PICTURE

"The Waiting Harvest—Coal Chemicals."

10:15 A. M.—CONTINUOUS MINING

Opening of Convention: L. C. CAMPBELL, Vice-Pres., Eastern Gas & Fuel Associates, Chairman, AMC Coal Division.

Chairman: HUGH B. LEE, Pres., Maumee Collieries Co.

Basic Requirements for Successful Continuous Mining

K. L. KONNERTH, Consultant, Pittsburgh.

A Complete Continuous Mining System

F. EARLE SNARR, Vice-Pres., Chicago, Wilmington & Franklin Coal Co.

Maintenance of Continuous Mining Equipment

WM. E. HESS, Mgr. of Coal Mines, Vesta Shannopin Div., Jones & Laughlin Steel Corp.

2:30 P. M.—ANNUAL MEETING MANUFACTURERS DIVISION

Tuesday—May 17

9:30 A. M.—PRE-SESSION MOTION PICTURE

"Discover Jamaica—A Travelogue."

10:00 A. M.—MECHANICAL MINING

Chairman: BIRCH BROOKS, Vice-Pres., Viking Coal Corp.

Mechanical Mining in Thick Seams

R. J. BOWEN, Mine Engr., Columbia-Geneva Steel Div., U. S. Steel Corp.

Mechanical Mining in Thin Seams

A. H. MANDT, Vice-Pres. and Mgr., Stephens Elkhorn Fuel Corp.

Mechanical Mining and Long Hole Drilling in Pitching Seams

G. A. SCHNEE, Gen. Supt., Philadelphia & Reading Coal & Iron Co.

Maintenance Cost Accounting

RALPH W. HATCH, Statistician, Hanna Coal Co.

9:30 A. M.—PRE-SESSION MOTION PICTURE

"Du Charbon et Des Hommes" (Men and Coal).

10:00 A. M.—ROOF SUPPORT

Chairman: CHARLES B. BATON, Vice-Pres., Joanne Coal Co.

Latest Developments in Mine Roof Bolting

E. M. THOMAS, Mining Engr., Roof Control, U. S. Bureau of Mines.

Methods and Results With Mine Roof Bolting

E. H. GREENWALD, Gen.-Mgr., Boone County Coal Corp.

Methods of Partial and Complete Pillar Extraction

W. F. DIAMOND, Chief Engr., Island Creek Coal Co.

Auger Drilling Pillars to Control Mountain Bumps

WOODS G. TALMAN, Gen. Supt., Coal Div., U. S. Steel Corp.



W. F. Diamond



Woods G. Talman



Wm. W. Dukes



Gene Long



H. A. Ravio



R. H. Kress



A. S. McClimon



Hoyt W. Smith



E. B. Leisenring, Jr.



T. M. Barry



Stephen Krickovic



W. L. Husk

1:30 P. M.—PRE-SESSION MOTION PICTURE
The Army Engineer—U. S. Dept. of Defense.

2:00 P. M.—STRIP MINING

Chairman: E. C. WEICHEL, Vice-Pres., Hudson Coal Co.

Two-Seam Stripping and Overland Belt Haulage
WM. W. DUKES, Supt., Stonefort Corp.

The Truax-Traer Wheel Excavator
GENE LONG, Asst. Mine Supt., Truax-Traer Coal Co.

New Improved Truck Designs to Raise Haulage Efficiency

H. A. RAVIO, Special Representative, Sales Div., Caterpillar Tractor Co.

R. H. KRESS, Exec. Vice-Pres., Dart Truck Co.

A. S. MCCLIMON, Mgr., Sales Development, Euclid Div., General Motors Corp.

HOYT W. SMITH, Chief Engr., Equipment Section, LeTourneau-Westinghouse Co.

Wednesday—May 18

9:30 A. M.—PRE-SESSION MOTION PICTURE
"Columbia—Land of Contrast—A Travelogue."

10:00 A. M.—FOREMANSHIP—MAINTENANCE—COST CONTROL

Chairman: JAMES HYSLOP, Pres., Hanna Coal Div., Pittsburgh Consolidation Coal Co.

An Evaluation System for Foremanship and Its Uses

E. B. LEISENRING, JR., Asst. to Pres., Stonegate Coke & Coal Co.

Machine Breakdowns Can Be Prevented

HUGH H. FRASER, Managing Dir., and H. E. Hastings, Dir., H. H. Fraser and Associates, Ltd.

Also Pres. and Vice-Pres., Fraser, Weir, and Associates.

Industrial Engineering Applied to Coal Mining

T. M. BARRY, Industrial Engr., Barry and Co., Management Engineers.

9:30 A. M.—PRE-SESSION MOTION PICTURE
"Arctic Rampart—Greenland Air Base."

10:00 A. M.—HAULAGE AND POWER

Chairman: C. O. KANE, Mgr., Coal Mines, Armco Steel Corp.

Considerations in Designing a Mine Haulage System

STEPHEN KRICKOVIC, Chief Engr., Eastern Gas & Fuel Assoc.

Shuttle Car Haulage With Conventional Mining
W. L. HUSK, Chief Engr., West Kentucky Coal Co.

Mechanical Loading on Bridge Conveyors
MYRON KOK, Gen. Mgr., Warner Collieries Co.

Mechanical Loading Directly Into Mine Cars
JOSEPH JOHNSON, Supt., and JOHN B. HARVEY, Chief Engr., Perry Coal Co.

Use of AC and DC for Underground Power
W. R. MORTON, Engr., General Electric Co.

(Continued next page)



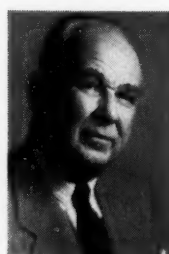
Myron Kok



Joseph Johnson



W. R. Morton



J. Robert Bazley



Forbes Clarke



J. A. Miner



Fred O. See



J. M. Poindexter



Quentin G. Bullock



R. T. Todhunter, Jr.



H. A. Quenon



M. A. Williams



W. C. Campbell



John A. Stachura

Thursday—May 19

1:30 P. M.—PRE-SESSION MOTION PICTURE

"BLACK DIAMONDS—Story of Anthracite."

2:00 P. M.—STRIP MINING

Chairman: W. E. MULLINS, Vice-Pres., Midland Electric Coal Corp.

Latest Anthracite Strip Drilling Practices

J. ROBERT BAZLEY, Pres., J. Robert Bazley, Inc.

New Drilling Developments in Bituminous Strip Mining

FORBES CLARKE, Field Supt., United Electric Coal Cos.

The Akremite Blasting Process for Strip Mining

J. A. MINER, Pres., Colonial Coal Mining Co., Inc.

Auger Mining Correlated With Strip and Deep Mining—

FRED O. SEE, Vice-Pres., Cardox Corp.

J. M. POINDEXTER, Sales Representative, Salem Tool Co.

QUENTIN G. BULLOCK, Vice-Pres., Compton, Inc.

9:30 A. M.—PRE-SESSION MOTION PICTURE

"The Waiting Harvest—Coal Chemicals."

10.00 A. M.—CONTINUOUS MINING

Chairman: D. L. McELROY, Vice-Pres., Pittsburgh Consolidation Coal Co.

Continuous Mining in 42-Inch Coal

R. T. TODHUNTER, JR.

Pillar Extraction With Continuous Mining

H. A. QUENON, Div. Mgr., Eastern Gas & Fuel Associates.

Service Haulage for Continuous Mining—Extensible Conveyors:

M. A. WILLIAMS, Gen. Supt., Oglebay, Norton & Co.

Portable Surge Cars:

W. C. CAMPBELL, Asst. to Vice-Pres., Old Ben Coal Corp.

Continuous Mining With AC Power

JOHN A. STACHURA, Gen. Supt., Enoco Collieries, Inc.



Emery Milligan



J. S. Snyder



J. E. Tobey, Jr.



David G. Werner



H. R. Middleton



M. J. Ankeny



James B. Benson



H. T. Batman



J. J. Forbes



Edward Steidle



Charles B. Ferguson



Thomas Allen

9:30 A. M.—PRE-SESSION MOTION PICTURE

Pigeonholes and Progress—U. S. Post Office Dept.

10:00 A. M.—COAL PREPARATION

Chairman: W. J. SKEWE, Chief Engr., Pocahontas Fuel Co., Inc.

Fine Coal Preparation of Illinois No. 6 Seam

EMERY MILLIGAN, Prep. Engr., Freeman Coal Mining Corp.

Processing Small Sizes for Competitive Fuel Markets

J. D. SNYDER, Mining Engr., and J. E. TOBEY, JR., Industrial Sales Engr., Blue Diamond Coal Co.

Cleaning and Drying Fine Sizes of Pittsburgh Coal

DAVID G. WERNER, Preparation Plant Foreman, Mathies Coal Co.

Anthracite Recovery From Silt Deposits at Jeddo-Highland

H. R. MIDDLETON, Sales Mgr., The Wilmot Engineering Co.

1:30 P. M.—PRE-SESSION MOTION PICTURE

"Great American Forests."

2:00 P. M.—SAFETY PANEL

Chairman: R. E. KIRK, Consulting Engr., Kirk and Cowin, Birmingham, Ala.

Accident Prevention in Coal Mines—

M. J. ANKENY, Safety Dir., Bituminous Coal Operators Assn.

JAMES B. BENSON, Director of Safety, Southern Coal Producers Assn.

H. T. BATMAN, Lynch Coal Operators Assn. of Indiana.

J. J. FORBES, Dir., U. S. Bureau of Mines.

EDWARD STEIDLE, Chairman, Federal Coal Mine Safety Board of Review.

CHARLES B. FERGUSON, Dir. of Safety Div., United Mine Workers of America.

THOMAS ALLEN, Chief, Colorado Coal Mine Inspection Dept.

(Continued from page 59)

the stage productions of "The Caine Mutiny Court Martial," a drama at the Euclid—77th St. Theater or a comedy "The King of Hearts" at the Francis E. Drury Theater.

For the Ladies

Many of the ladies who are coming to the 1955 Coal Show have been to Cleveland before and are planning to take advantage of the city's fine shops and to revisit its points of interest. Those who are coming for the first time have a treat in store. They are all, of course, welcome at the convention sessions and the Exposition and especially at the Coal Miners Party. In addition a series of events has been planned particularly for their entertainment.

At the Welcoming Luncheon on Monday, Bill Hixson, noted floral designer, will amuse the ladies with his talk on "Fun with Flowers."

(Continued on page 66)



Manufacturers DIVISION

*ACF Industries, Inc.
Allegheny Ludlum Steel Corp.
Allen-Sherman-Hoff Pump Co.
*Allis-Chalmers Mfg. Co.
Alloy Steel & Metals Co.
American Air Filter Co., Inc.
American Brattice Cloth Corp.
*American Manganese Steel Division
American Brake Shoe Co.
American Chain & Cable Co.
*American Cyanamid Co.
American Mine Door Co.
Anaconda Wire & Cable Co.
Armstrong Coalbreak Co.
*Atlas Powder Co.

Baldwin-Lima-Hamilton Corp.
Lima-Hamilton Division
Barber-Greene Co.
Bearing Service Co.
Bethlehem Steel Co.
Bird Machine Co.
Bixby-Zimmer Engineering Co.
Bowditch Co.
Broderick & Bascom Rope Co.
Brooks Oil Co.
Brunner & Lay Rock Bit Corp.
Bucyrus-Erie Co.

Carboloy Department
General Electric Co.
Card Iron Works Co., C. S.
Cardox Corp.
Caterpillar Tractor Co.
Central Mine Equipment Co.
Centrifugal & Mechanical Industries, Inc.

* Charter Members.

Chicago Pneumatic Tool Co.
Cincinnati Mine Machinery Co.
Cities Service Petroleum, Inc.
Clarkson Mfg. Co.
Cleveland Rock Drill Division
General Motors Corp.
Compton, Inc.
Copco Eastern Ltd.
Copco Pacific Ltd.
Cross Engineering Co.
Crucible Steel Co. of America
Cummins Engine Co., Inc.

D-A Lubricant Co., Inc.
Deister Concentrator Co.
Deister Machine Co.
Differential Steel Car Co.
Dings Magnetic Separator Co.
Dorr-Oliver, Inc.
Dow Chemical Co.
Duff-Norton Mfg. Co.
*Du Pont de Nemours & Co., Inc., E. I.

Eastern Car & Construction Co.
*Edison, Inc., Thomas A.
Eimco Corp.
Electric Steel Foundry Co.
Electric Storage Battery Co.
*Elreco Corp.
Engineers Syndicate, Ltd.
Ensign Electric & Mfg. Co.
*Enterprise Wheel & Car Corp.
Euclid Division
General Motors Corp.

Fairmont Machinery Co.
Femco, Inc.
Firestone Tire & Rubber Co.
Firth Sterling, Inc.
Fletcher & Co., J. H.
Flexible Steel Lacing Co.
Flood City Brass & Electric Co.

Gardner-Denver Co.
*General Electric Co.
*Godman Mfg. Co.
Goodrich Co., B. F.
Off-The-Road Tire Sales
Goodyear Tire & Rubber Co., Inc.
Gorman-Rupp Co.
Gould-National Batteries, Inc.
Guyan Machinery Co.

Harnischfeger Corp.
*Hendrick Mfg. Co.
Hendrix Mfg. Co., Inc.
Hercules Motors Corp.
*Hercules Powder Co.
Hewitt-Robins Incorporated
Heyl & Patterson, Inc.
*Holmes & Bros., Inc., Robert
Hughes Tool Co.
*Hulburt Oil & Grease Co.
Humphreys Investment Co.
Engineering Division

Ingersoll-Rand Co.
International Nickel Co., Inc.
Interstate Equipment Division
Yara Engineering Corp.
Irwin Foundry & Mine Car Co.
*I-T-E Circuit Breaker Co.

*Jeffrey Mfg. Co.
Johnson-March Corp.
*Joy Mfg. Co.

Kanawha Mfg. Co.
Kansas City Structural Steel Co.
Kennametal Inc.
Kensington Steel Co.
Koehler Mfg. Co.

Lake Shore Engineering Co.
Lee-Norse Co.
*Leschen Wire Rope Division
H. K. Porter Co., Inc.
LeTourneau-Westinghouse Co.
*Link-Belt Co.
Long Co., The
Longyear Co., E. J.
Ludlow-Saylor Wire Cloth Co.

*McGraw-Hill Publishing Co.
McLanahan & Stone Corp.
*McNally-Pittsburg Mfg. Corp.

Mack Motor Truck Corp.
Macwhyte Co.
Manu-Mine Research & Development Co.

Marion Power Shovel Co.
Mechanization, Inc.
*Mine Safety Appliances Co.
Mine & Smelter Supply Co.
Mining Machine Parts, Inc.
Mosebach Electric & Supply Co.
Mott Core Drilling Co.
Murphy Diesel Co.
*Myers-Whaley Co., Inc.

Nachod & United States Signal Co.
National Electric Coil Co.
National Malleable & Steel Castings Co.
National Mine Service Co.
Nolan Co.
Nordberg Mfg. Co.
Northwest Engineering Co.

*Ohio Brass Co.
Ohio Carbon Co.
Okonite Co.
Hazard Insulated Wire Works Div.
Olin Mathieson Chemical Corp.
Osmose Wood Preserving Co.

Page Engineering Co.
Pattin Mfg. Co.
Penn Machine Co.
Peterson Filters & Engineering Co.
*Phillips Corp.

Pioneer Engineering Works, Inc.
Pittsburgh Screw & Bolt Corp.
Post-Glover Electric Co.
Productive Equipment Corp.
Prox Co., Inc., Frank

Quaker Rubber Corp.

Raybestos-Manhattan, Inc.
Reich Bros. Mfg. Co.
Reliance Electric & Engineering Co.
Republic Rubber Division
Lee Rubber & Tire Corp.
*Roberts & Schaefer Co.
*Roebbling's Sons Corp., John A.
Rome Cable Corp.

*S K F Industries, Inc.
Salem Tool Co.
Sanford-Day Iron Works, Inc.
Schroeder Brothers
Sheffield Steel Division, Armco Steel Corp.
*Simplex Wire & Cable Co.
Simplicity Engineering Co.
Southwestern Engineering Co.
Sprague & Henwood, Inc.
Stearns Magnetic Inc.
Stearns-Roger Mfg. Co.
Sterling Steel Casting Co.
Sun Oil Co.

Talcott, Inc., W. O. & M. W.
Tamping Bag Co.
Texas Co.
Thor Power Tool Co.
Tide Water Associated Oil Co.
*Timken Roller Bearing Co.
Tool Steel Gear & Pinion Co.
Tracy Co., Bertrand P.
Travel Drill Co.
Traylor Engineering & Mfg. Co.
*Tyler Co., The W. S.

Ultra Violet Products, Inc.
Union Iron Works
Union Wire Rope Corp.
*United Engineering & Constructors, Inc.
U. S. Rubber Co.
*U. S. Steel Corp.

Varel Mfg. Co.
Vascoloy-Ramet Corp.
Victaulic Co. of America
Vulcan Iron Works

Wedge Wire Corp.
Western Machinery Co.
Western Precipitation Corp.
Western Rock Bit Mfg. Co.
*Westinghouse Electric Corp.
West Virginia Steel & Mfg. Co.
White Motor Co.
Winter Weiss Co.

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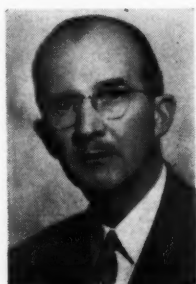


George W. Sall
Assistant Editor



J. J. Ward
Production Dept.

Mining Congress Journal



Ralph Duysters



Frank Moran

Field Representatives—Mining Congress Journal

(Continued from page 63)

On Tuesday plans call for a luncheon followed by a showing of the latest styles. The Higbee Co., one of Cleveland's leading department stores has taken over this phase of the program and is planning to show the ladies what "they" will be wearing in the months ahead.

Thursday afternoon will find the ladies on board the good ship *Carol Diane* for an all-water sightseeing cruise on Lake Erie and the Cuyahoga River.

Tickets for all the ladies' events have been going fast, but every effort will be made to take care of all who wish to attend.

Hurry! Hurry! Hurry!

As mentioned earlier, a record crowd is expected at the 1955 Coal Show. The Housing Bureau has promised comfortable rooms for all, and requests for hotel accommodations should be sent to the Cleveland Housing Bureau, 511 Terminal Tower, Cleveland 13, Ohio. Those driving to Cleveland may wish to take advantage of the city's many fine motels. Arrangements may be made direct or through the Housing Bureau.

In these and the following pages, an attempt has been made to paint a word picture of what lies in store for the thousands who will attend the 1955 Coal Show in Cleveland's Public Auditorium May 16-19. But mere words cannot do justice to the reality. The Coal Show is an experience. It must be seen and heard before its full import can be realized. Come to Cleveland in May. You'll be glad you did.



Exhibitors

• HERE is a preview of the 1955 AMC Coal Show. In the exhibit halls and on the Mall outside, more than 225 exhibits will occupy over 130,000 net sq ft. Look over the brief descriptions below of the products and services represented. Determine in advance which exhibits you will study in detail, what problems you will discuss with the experts. Make your visit to the Coal Show pay maximum dividends.

• **ACF INDUSTRIES, INC.**

Will show an all-steel drop bottom mine car. Transparencies will be displayed showing ACF mine cars in action and a modern type mine car wheel will be shown.

• **ACME MACHINERY CO.**

Will display a two-stage air-cooled self-propelled air compressor complete with twin stoper jumbo arms and a dust collector system. Also shown will be the "Stoper Jumbolter." *In charge—M. H. Evans.*

• **AERIAL SURVEYS INC.**

Description not available.

• **AERO SERVICE CORP.**

Mapping for tomorrow's world will be the theme of this exhibit. Aerial mapping and exploration will be featured. *In charge—George Hess and Tom Kirk.*

• **AEROQUIP CORP.**

Display will feature their new socketless fitting, together with a complete line of detachable, reusable fittings and self-sealing couplings. A workshop will be set up to show manufacturers how Aeroquip hose lines can be assembled on a production basis within a manufacturing plant. *In charge—M. W. Brandau.*

• **ALLEGHENY LUDLUM STEEL CORP.**

The Carmet Division of Allegheny Ludlum Steel Corp. will exhibit a complete line of cemented carbide cutting and drilling bits for the coal industry. Cutter bits, finger bits, roof bolting drill bits, and coal drills will be on display. A variety of cutting shapes and compositions will also be exhibited. *In charge—P. F. Rehner.*

• **ALLEN-SHERMAN-HOFF PUMP CO.**

Will feature their new Centriseal Pump for pumping abrasives and/or corrosive fluid-solid mixtures. The pump is totally lined with easily replaceable parts of rubber or synthetic substitutes. *In charge—William B. Stephenson.*

• **ALLIED CHEMICAL & DYE CORP.
SOLVAY PROCESS DIV.**

Will exhibit Solvay calcium chloride for freeze proofing and dust proofing of coal. *In charge—J. A. Manion.*

• **ALLIS CHALMERS MFG. CO.
BUDA CO. DIV.
GENERAL MACHINERY DIV.
TRACTOR DIV.**

Diesel engines, coal processing equipment and earth-moving machinery will be featured. The Buda Division will display diesel engines for powering shovels, trucks,

hoists and excavators and a 7½-kw diesel electric generator set. A 5 by 12-ft double-deck "Riplflo" vibrating screen in operation with new automatic stop control will be shown by the General Machinery Division. A 6 by 16-ft double deck Lowhead screen, a new rubber-lined pump, a newly designed solids-handling pump and general purpose equipment will also be exhibited. The Tractor Division will feature the recently announced model HD-21 crawler tractor with torque converter drive and a new master clutch transmission. Also shown will be a rubber-tired motor wagon, a motor grader, a three-yd torque converter tractor shovel and a tractor bulldozer. *In charge—H. H. Cohenour, H. A. Reinhard and H. G. Kilb.*

• **AMERICAN BRATTICE CLOTH CORP.**

Will exhibit their seven grades of brattice cloth for the coal mining industry. Samples will be available for examination. A model of ABC's new inflatable brattice will be on exhibit and there will also be samples of ABC's new "Neolon" tubing, a light-weight nylon base tubing. *In charge—D. Blaine Mikesell.*

• **AMERICAN CHAIN & CABLE CO., INC.**
WIRE ROPE DIVISIONS

Description not available.

• **AMERICAN CHEMSOL CORP.**

Will have as the theme of their exhibit "Chemicals for the Coal Industry." Roof coating, float and sink standardized solutions, and a rust preventative compound will be featured. Another group of chemicals will be shown including flocculants, reagents for froth flotation and weed killers. *In charge—Leonard Messer.*

• **AMERICAN CYANAMID CO.**
EXPLOSIVES DEPARTMENT

Featured will be the complete line of American Cyanamid Co. dynamite and blasting equipment for the coal industry. Realistic dummy products of various dynamites and electric blasting caps will be displayed. *In charge—A. J. Perantoni.*

• **AMERICAN MANGANESE STEEL DIVISION**
AMERICAN BRAKE SHOE CO.

Will display a complete line of manganese steel and hard-facing welding rods. A working exhibit will demonstrate the Amsco MF (Magnetic Flux) welder. They also plan to have a large automatic unit in operation, showing how to build up tractor rollers and idlers.

• **AMERICAN MINE DOOR CO.**

Will show for the first time their new Model 30 Track Cleaner, designed especially for low coal. Also on display will be the Little Chief portable high pressure rock duster, the Mighty Midget dock duster, and an electric switch thrower. *In charge—Glenn D. Gurney.*

• **AMERICAN MINE SUPPLY CO.**

Will use giant photos to show various application of American spads and hangers (insulated and plain). Among these uses are supports for fluorescent mine lights, brattice cloth, telephone lines, electric cables, water pipes and air hose. Demonstration of the American spad gun driving spads will be conducted. *In charge—O. C. Prickett.*

• **AMERICAN STEEL & WIRE DIVISION**
U. S. STEEL CORP.

See U. S. Steel.

• **ANACONDA WIRE AND CABLE CO.**

Display will be devoted to illustrating the application of the proper cable to various jobs around the mine. Featured will be a new type of shuttle car cable. *In charge—C. B. Peck.*

• **ARMCO DRAINAGE & METAL PRODUCTS, INC.**

Is going to feature a full length sound motion picture called "It takes Coal to Make Steel." On display will be models of Armco products used in the coal mining field such as: Armco steel buildings, "Multi-Plate" pipe, corrugated metal pipe, spiral welded pipe, liner plate, "Flex-Beam" guardrail and Armco "Hel-Cor" drainage pipe. *In charge—T. A. Harrison.*

• **ASHLAND OIL & REFINING CO., INC.**

Will feature new trends in oil treating commercial coals for lake, industrial and by-product customers, and mine greases and lubricants. *In charge—John L. Stewart.*

• **ATLAS POWDER CO.**

Will illustrate millisecond delay blasting techniques with three-D machine gun camera photographs. New explosives products, blasting supplies and accessories, including the Shotmaster generator-powered condensor discharge blasting machine, will also be shown. *In charge—J. H. Dannenberg.*

• **AUSTIN POWDER CO.**

Will exhibit a complete line of drilling equipment including all types of coal augers, roof drill augers and strip mine augers. Also shown will be a line of tungsten carbide cutting machine bits as well as drill bits for both underground and strip mining. *In charge—Neil Baker.*

• **BALDWIN-LIMA-HAMILTON CORP.**
CONSTRUCTION EQUIPMENT DIVISION

Exhibit will consist of photographic display panel covering Lima-made products and their application to the coal industry.

• **BARBER-GREENE CO.**

Will have on display several standardized components of their heavy duty belt conveyor line, including a display of several types of troughing carriers and return rollers and a dis-assembled gearbox to show its design features. A photographic display will round out the exhibit.

• **BEARING SERVICE CO.**

Will feature ball and roller bearings for the mining industry. *In charge—William F. Chase and P. H. Boone.*

• **BETHLEHEM STEEL CO.**

Exhibit will be devoted to products for safer mining and faster haulage. On display will be mine roof bolts, the new yieldable mine arch for use under heavy roof conditions, heavy-duty prefabricated mine track, mine cars, forged mine car wheels, a wire rope machine, wire rope for both underground and surface operations, and hollow drill steel for rock drilling. *In charge—A. A. Warg.*

• **BIRD MACHINE CO.**

Will present for the first showing in this country the Bird-Humboldt Centrifugal Dryer for dewatering fine coal. A complete range of fine coal dewatering equipment built by Bird will be available for inspection, including the Bird continuous centrifugal coal filter, the Bird-Pravon rotary horizontal pan-type vacuum filter and the Bird-Young continuous drum-type vacuum filter. *In charge—George Sherrerd.*

• **BIXBY-ZIMMER ENGINEERING CO.**

Scale model vibrators will be in operation showing various applications of Bixby-Zimmer stainless steel rod screens. A new grizzly rod screen will be featured. *In charge—Ray L. Kaga.*

• **BLACKHAWK MFG. CO.**

Will feature Porto-Power, heavy remote controlled jacks, hydraulic hand jacks and hand tools for all types of min-

ing machinery maintenance. Demonstrations will be conducted to show the safety and speed factors of the tools. *In charge—John Allen.*

• **BOSTON WOVEN HOSE & RUBBER CO.**

Will exhibit a complete line of conveyor belts, V-belts, industrial hose, packing and tape. A miniature working model of the Rotocure machine, which has made possible the continuous vulcanization of rubber, will also be featured. At the Show, Boston will announce a new line of high tension belting, especially designed to meet the requirements of long center and high unit stress conveyor and elevator belt installations.

• **BOWDIL CO., THE**

Will exhibit a complete line of coal cutting chains for all kinds of mining machines. A complete line of Bowdil bits and cutter bars will also be on display. *In charge—F. T. Bowman.*

• **BRAKE ENGINEERING CO.**

Will feature "Automatic Variable Arc Compensator" mechanisms incorporated into present type brake and clutch friction bands and shoes. *In charge—David N. Goldberg.*

• **BROWNING DUST COLLECTOR CO.**

Will use an artistic photograph display to feature Yellow Strand wire ropes in mining use. One part of the exhibit will be devoted to a display indicating the different wire combinations used in the manufacture of mining ropes. *In charge—Fred Zimmerman and J. J. Sieber.*

• **BRODERICK & BASCOM ROPE CO.**

Will exhibit pantograph arms for mounting stoper drills, and a new design dust collector which requires no set up time. They will also show other model dust collectors for percussion and rotary drilling. *In charge—Charles Dawson.*

• **BUCYRUS-ERIE CO.**

Will feature a working model of a B-E 6-yd 150-B electric shovel. Scaled down to $\frac{1}{12}$ of natural size, the model performs all shovel functions and will be shown in operation using an operator's station from a full size machine. *In charge—R. M. Dickey.*

• **BURNDY ENGINEERING CO., INC.**

Will feature the Mighty Midget line of connectors, and the Burndy method of emergency repair splicing of flexible mine machine cables at the "face" and permanent splicing in cable repair shops. Sample type "G" trailing cable will be shown with short barrel "Hylinks" installed.

• **CARBOLOY DEPARTMENT
GENERAL ELECTRIC CO.**

A complete line of carbide-tipped mining tools, rock-bits, masonry drills and related items will be featured. *In charge—A. F. Dobbrod.*

• **CARDOX CORP.**

The company will feature for the first time several new models of "Airdox" units of both the stationary and semi-portable types. A diesel-driven model 155 Cardox surface auger miner will also be on exhibit. A tractor mounted vertical drill will be shown for the first time along with other types of portable drilling equipment. *In charge—Paul C. Manley and R. E. Gerdetz.*

• **CATERPILLAR TRACTOR CO.**

Exhibit will consist of track type tractors, scrapers, coal haulers, and diesel-electric sets. An appropriate picture display of various mining operations in which Caterpillar

equipment is used will round out the exhibit. *In charge—C. D. Bucy.*

• **CENTRIFUGAL AND MECHANICAL INDUSTRIES, INC.**

Will show a field model centrifuge along with cyclones of various sizes. Equipment improvements made during the last two years will be featured. *In charge—P. W. Bigley.*

• **CHICAGO PNEUMATIC TOOL CO.**

Are going to feature electric and air-operated roof bolting equipment. Included in the display will be the all-electric Model RBD-30 bolting unit adaptable to high or low coal, the CP-134 Short Stoper, and a CP Impact Wrench. Other equipment to be shown include the new CP Integral Sinker Airleg mounting a CP-32A Wet Sinker and a new lightweight hand-held CP Hydraulic Coal Drill.

• **CINCINNATI MINE MACHINERY CO., THE**

Featured will be the completeness of the company's line of cutter chains, cutterbars, sprockets and cutterbits. Units of the various designs for use on all types of equipment will be displayed together with enlarged action photographs. *In charge—John R. Cartridge.*

• **CITIES SERVICE PETROLEUM, INC.**

Will have industrial lubricants for the mining industry on display. A color movie will be shown depicting the resources and facilities of Cities Service. A combustion analyzer used extensively on coal fired boilers and furnaces for obtaining greater fuel economies and higher operating efficiency will also be shown. *In charge—Albert A. Haas.*

• **CLARK EQUIPMENT CO.
CONSTRUCTION MACHINERY DIV.**

On display will be three tractor shovels and an excavator-crane as well as a working model tractor shovel. Featured will be power train components, sectionalized components and a wide variety of "on-the-job" photographs of various models of shovels and excavator cranes. *In charge—Clarence E. Killebrew and George M. Barnard.*

• **CLARKSON MANUFACTURING CO.**

Featured will be the various types of conveyor chains manufactured by Clarkson. In addition there will be action photographs of the Marietta Continuous Miner and the Clarkson Loading Machine. *In charge—John Compton.*

• **CLEVELAND ROCK DRILL DIVISION
WESTINGHOUSE AIR BRAKE CO.**

Plan to feature an entirely new design of stoper for roof bolting which is especially adapted to very low coal. The stoper is of the dust collector type and the complete outfit will include a newly designed dust collector system. Also shown will be their regular line of one-use bits and the Acme "Jumbolter" which mounts Cleveland stopers, stoper arms and dust collection system. *In charge—N. W. Reinker.*

• **COAL AGE**

Will have its complete staff available for consultation. *In charge—Carl Coash.*

• **COAL MINE EQUIPMENT SALES CO.**

Will have a photographic display and will distribute literature about the mining equipment the company rebuilds and sells. *In charge—Frank J. Wolfe and James C. Lindsay.*

• **COLORADO FUEL & IRON CO.
WICKWIRE SPENCER STEEL DIV.**

Will feature Wickwire Wire Rope and Wire Rope Slings. Also shown will be industrial space screens and rock bolts. *In charge—George C. Jennings.*

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• **COMBUSTION ENGINEERING, INC.**

A working model C-E Raymond flash drying system for fine coal will be featured. It will show the latest developments and improvements through the use of plastic construction.

• **COMPTON, INC.**

An outside exhibit will feature the Model 28 Compton coal auger, completely assembled and in action. An inside display will contain photographs of various applications of augers to different mining conditions and coal seams. A cutter head will also be shown. *In charge—Quentin G. Bullock.*

• **CONTINENTAL MOTORS CORP.**

Exhibit will feature a cut-away moving HD-260 Continental diesel engine.

• **COOKE-WILSON ELECTRIC SUPPLY CO.**

Replacement parts for mining equipment will be shown. Featured will be gears, worms, shafts and similar parts. *In charge—Thos. W. Henderson.*

• **CUMMINS ENGINE CO., INC.**

Will feature two new developments of interest to strip miners. The Cummins PT Fuel System, which Cummins reports drastically reduces diesel engine maintenance costs, is one development. The other is a new line of Turbo-diesels which develop up to 16 percent more power than supercharged engines of the same cubic inch displacement and up to 75 percent more power than nonsupercharged engines of the same size. Cutaway models of the 235-hp, 335-hp, and the 600-hp engines will be displayed. *In charge—J. W. Rowell.*

• **D-A LUBRICANT CO., INC.**

The complete line of heavy duty oils and lubricants manufactured and distributed by the company will be on display. Factory representatives will be on hand for consultation on lubrication problems. *In charge—Robert J. Binford, Jr.*

• **DART TRUCK CO.**

A Model 50 SBDT bottom dump coal hauler with 50 to 60-ton capacity will be featured. Operating costs of this unit will be shown on a large card display. In addition, a Model 20T, 20-ton tandem diesel-powered gob hauler, will be shown. *In charge—L. B. Philippi.*

• **DAVEY COMPRESSOR CO.**

Will show the new Davey model M-8A truck-mounted rotary air drill. The design incorporates a 500 cfm air compressor; an 8-in., three-speed, heavy-duty rotary table; combination manual and hydraulic chain pull down; 20,000 lb working capacity, and double acting hydraulic cylinders for mast raising and lowering. *In charge—P. H. Nast.*

• **DEISTER CONCENTRATOR CO., THE**

Will exhibit a ¼ size model of the "SuperDuty" Diagonal Deck Coal Washing Table; a commercial size Leahy Vibrating Screen equipped with "FlexElex" heated screen cloth, a commercial size "Concenco" distributor used for distributing feed to batteries of coal washing tables and other apparatus. Spray nozzles will be shown in actual operation. *In charge—S. A. Stone.*

• **DETROIT DIESEL ENGINE DIVISION
GENERAL MOTORS CORP.**

Will display three of its diesel models commonly used in off-highway hauling units. In addition, a 3-cylinder motorized cutaway unit demonstrating the operation of GM's two-cycle diesel will be shown. *In charge—J. C. Campbell.*

• **DIFFERENTIAL STEEL CAR CO.**

Will feature a large capacity 8-wheel mine car for low coal seams. *In charge—R. D. Flowers.*

• **DODGE MANUFACTURING CORP.**

Four new power transmission products will be introduced in this exhibit. A dynamic demonstrator will show operational advantages of Flexidyne, "the dry-fluid drive." A second demonstrator will enable visitors to operate the new Dodge Air-Grip clutch. A new Torque-Arm speed reducer with 60-hp capacity will be displayed and the Dodge Taper-Lock timing belt drive will have its initial showing with the Taper-Lock group which includes a large cut-away conveyor pulley, V-belt sheaves, sprockets and couplings. *In charge—Carl Beebe.*

• **DOOLEY BROS.**

Will have on display a combination hydraulic and electric roof drill mounted on an arm capable of 240° swing. Drilling is done with an electric motor and feed supplied by a hydraulic cylinder. *In charge—Art Armitage.*

• **DORR-OLIVER INC.**

Will show scale models of horizontal and disc type filters used for dewatering fine coal. Flowsheets will indicate the various operations where Dorr-Oliver products are used. Specialists will be on hand to discuss the application of this equipment to specific or unusual requirements. *In charge—R. A. Johnson.*

• **DOW CHEMICAL CO., THE**

Plan to show the uses of Separan 2610, a new flocculating material developed for use in metal and coal mining.

• **DUFF-NORTON MFG. CO.**

A complete line of ratchet, screw and hydraulic jacks will be featured. Included in the exhibit will be a five and ten-ton ratchet lowering jack for re-reeling and repairing mine locomotive and cars and a complete line of mine roof support jacks. *In charge—E. H. Hodgson.*

• **DU PONT DE NEMOURS & CO., INC., E. I.**

The Explosives Department and the Textiles Fiber Department will have a combined exhibit. Featured by the Explosives Department will be the importance of research as an aid to the coal industry. Photographic display of explosives research equipment and several high-speed photographs of explosives in action will be shown.

The Textiles Fiber Department exhibit will be designed to show how du Pont fibers are helping to make present-day mining more efficient. *In charge—J. M. Pierson and C. H. Reinhardt.*

• **ELECTRIC STEEL FOUNDRY CO.**

Will have on display a completely rigged 4½-yd tapered dragline bucket and an Esco swivel dump block. Buck Forte dozer-rooters, cutting edges, end bits, a patented Esco wedge-type dipper door and other special products such as points, adapters and bucket rigging will also be on display. *In charge—Joe McQuaid.*

• **ELECTRIC STORAGE BATTERY CO.
EXIDE INDUSTRIAL DIV.**

Exhibit will feature the new T H Exide-Ironclad battery for mining service. Cutaway cells will show the use of Silvium, a new alloy, and the extensive use of polyethylene in the construction of this battery. Also shown will be a complete line of industrial batteries for motive power, diesel engine starting, switchgear operation, emergency light and power and telephone service. *In charge—J. S. Gillespie.*

• **ENSIGN ELECTRIC & MFG. CO.**

Will have on display its line of rail bonds, Clark mine type starters, safety belt control, centrifugal switches with a "dustite" and explosion tested enclosures, cable splices, trolley guard supports and power distribution boxes. The latter will feature a new mechanical circuit breaker tripping unit displacing the conventional shunt trip. *In charge—W. P. Dickson.*

• **ENTERPRISE WHEEL & CAR CORP.**

Will feature the aluminum mine car first displayed at the last coal show. Since that time the car has been in continuous service and this exhibit will serve to demonstrate the durability of the aluminum car. *In charge—Robert W. Lahr.*

• **EUCLID DIVISION
GENERAL MOTORS CORP.**

Will feature their complete line of earth-moving equipment. Of especial interest will be cutaway models showing various components of "Torqmatic" drive, and power trains. *In charge—R. E. Keidel.*

• **FAILING CO., GEO. E.**

A new hydraulic chain feed blast hole rotary rig, the Failing CBH Holemaster, will be featured. It combines chain feed with the use of compressed air for the removal of cuttings. *In charge—H. J. Godschalk.*

• **FAIRMONT MACHINERY CO.**

Exhibit will feature the services offered by the company in the field of coal preparation. Display of Fairmont density controls for Chance Cones, dense media vessels and a Parrish type dewatering screen will also be shown. *In charge—V. R. Graves.*

• **FEMCO, INC.**

The company's relay, tone and carrier type remote control and indication systems will be featured. Remote control of circuit breakers will be demonstrated in a visitor participation display. Also shown will be the company's line of communication systems and the Femco permissible shot firer. *In charge—N. F. Agnew and W. P. Place.*

• **FIRTH STERLING, INC.**

Will have on display the complete line of machine bits, roof bits, drill bits, and finger bits manufactured by the company. *In charge—Harold A. Zell.*

• **FLETCHER & CO., J. H.**

Featured will be a Fletcher model DAF Roof Drill in operation to demonstrate its main features. In addition, both the very low, 28-in. model DAE and the medium height, 48-in. model DAB drills will be shown with such optional extras as cable reel, dust collector and hard-rock drilling attachment. *In charge—William F. Fletcher.*

• **FLEXIBLE STEEL LACING CO.**

Will demonstrate new self-vulcanizing repair materials for conveyor belts and electrical cables. The display will be built around a conveyor carrying a 24-in. belt joined with the latest "Flexco" joints. A number of new application tools will be demonstrated for the first time. *In charge—Warren Paulson.*

• **FLOOD CITY BRASS & ELECTRIC CO.**

Display will consist of trolley line material and other electrical equipment such as switches, controllers and headlights. Also shown will be replacement parts for various types of mining equipment such as locomotives, mining machines, loaders and pumps. *In charge—L. A. Grasso.*

• **FUEL PROCESS CO.**

Plan to use photo-murals and flo-diagrams to demonstrate the new Belknap coal washing system. *In charge—O. L. Watson.*

• **FULTON BAG & COTTON MILLS**

Description not available.

• **GENERAL ELECTRIC CO.**

Display will feature a new track-laying shuttle car for mine use. Other equipment shown will include a d-c rectifier car, various types of motors, a motor control center and wire and cable for mine service. *In charge—R. O. Ketner.*

• **GOODMAN MFG. CO.**

Including Mancha Storage Battery Div. and Diamond Iron Works Div.

Highlighting the Goodman exhibit will be three pieces of new equipment; a Type 400 boring type continuous miner, a 26-in. height shuttle car, and a rigid head tractor tread loader for low coal. Also on display will be a 48-in. height shuttle car, a swing-motion loader for low seam work and a rubber tired cutting machine. *In charge—C. M. Graham.*

• **GOODYEAR TIRE & RUBBER CO., INC., THE**

Will display a working model of the proposed Riverlake conveyor system from Cleveland to the Ohio River. The exhibit will include appropriate scenic background and a recorded amplified description of this project.

• **GORMAN-RUPP CO.**

Will present its line of self-priming centrifugal pumps in both active demonstration and formal display. Included will be a 2-in., self-priming pump operating in an open tank. Engine driven, self-priming "30 Series" pumps on pneumatic mount for use in strip mining drainage will also be displayed. *In charge—Gilmore Hiatt.*

• **GOULD-NATIONAL BATTERIES, INC.**

Featured will be Gould's Plus Performance Plan and Better Batteries Through Research. The plus performance plan was developed to help battery users maintain top performance from their batteries and increase the service period. *In charge—J. S. McCullough.*

• **GULF OIL CORP.**

Description not available.

• **GUNDLACH MACHINE CO., T. J.**

Plan to show a two-stage double-adjustable crusher complete with 40-hp motor, both driven by a ¼-hp motor. Large scale prints and photographs of other model crushers and installations will also be shown. *In charge—G. C. Breidenbach.*

• **HAMILTON RUBBER MFG. CORP.**

Exhibit will feature coal conveyor belting. Literature and photographs of various installations using Hamilton belting, along with actual samples of the belting, will be available. *In charge—H. H. Todd.*

• **HARNISCHFEGER CORP.**

Featured will be a full scale, operating model of the new P & H electronic control for P & H electric shovels. These controls will be operative and show-goers will be invited to try them out. A magnetorque hoist drive for P & H electric shovels will also be exhibited as will recent additions to the P & H hoist and welding equipment line. *In charge—Bernard Germershausen.*



• **HAWTHORNE, INC., HERB J.**

The many functions of the company in the field of oil and mineral exploration will be featured. *In charge—Earl M. Weaver.*

• **HENDRICK MFG. CO.**

Exhibit will emphasize all sizes of perforated metal for use in sizing, dewatering and screening. Wedge slot and wedge wire screens will also be shown. *In charge—T. A. Warner.*

• **HENDRIX MFG. CO.**

Will have on display its latest model stripping bucket featuring the company's cast 14 percent manganese steel lip, chains and fittings. *In charge—George E. Trippe and William R. Hendrix.*

• **HERCULES MOTORS CORP.**

Display will be made up of several different engines and power units available for application in the mining industry. Two, four, six, and eight cylinder gasoline and diesel engines will be displayed with horsepower ratings from 3 to 500. *In charge—T. S. Klinedinst.*

• **HERCULES POWDER CO.**

Will feature their wide variety of permissible blasting agents. The exhibit also will include a representative selection of the company's blasting supplies of interest to the coal mining industry.

• **HEWITT-ROBINS INCORPORATED**

Will exhibit a 60-ft long shuttle belt conveyor, the "Mine-veyor"; a new type vibrating screen; a "Robintronic" bin level indicator, and a new stronger conveyor belt for use in transporting material over long distances and up steep grades. *In charge—R. U. Jackson.*

• **HEWITT RUBBER CO. OF PITTSBURGH**

Exhibit will feature the "Minet" belt splice. This is a mechanical splice for use on underground mine conveyor belts and fixed conveyor installations. *In charge—M. S. Lambert.*

• **HEYL & PATTERSON, INC.**

A 36-in. Reineveld Coal Dryer and a 24-in. Reineveld Centriplane, used for dewatering slurry, will be featured. This is the first exhibition of the latter machine. A bank of H & P cyclones, including a take apart model, will complement the above equipment. Prevention of stream pollution will be emphasized. A working model of the H & P car dumper will also be demonstrated. *In charge—Thomas M. Ogg.*

• **HOLMES & BROS., INC., ROBERT**

Will have on display Holmes Spirals for lowering coal of all sizes automatically; Baughman Verti-Vane Thermal Dryers for drying 1½ in. coal; car handling equipment for movement control under tipples; laboratory crushers and pulverizers, and Holmes hoisting equipment for deep mines. *In charge—James G. Walter.*

• **INTERNATIONAL HARVESTER CO.
INDUSTRIAL POWER DIV.
MOTOR TRUCK DIV.**

Featured by the Industrial Power Division will be two new machines—the International 75 Payscraper and a TD-24 torque converter diesel crawler tractor. The former has a 262-hp engine, holds an 18-cu yd load and will travel at a rate of 24 mph. The TD-24 has 200-net hp. A Model RF-230 International Truck will be shown by the Motor Truck Division. Designed for off-highway use, it is equipped with a 201-hp engine. *In charge—J. F. McCoy and J. W. Young.*

• **INTERSTATE EQUIPMENT DIVISION
YARA ENGINEERING CORP.**

Will have large-scale illustrations and photographs of recent tramway installations. Detailed views of the drive wheel and control equipment of a 660-hp drive with a two-in. haulage rope under an operating tension of 80,000 lb will be highlighted. *In charge—Leo J. Vogel.*

• **IRWIN FOUNDRY & MINE CAR CO.**

Plan to exhibit ¼-size scale models of their 8-wheel streamliner mine car and their 8-wheel "Man-van" car. Feature of the exhibit will be a new feeder conveyor designed to receive coal from shuttle cars and feed it evenly onto a belt conveyor or chain pan line. *In charge—Robert L. Rae.*

• **I-T-E CIRCUIT BREAKER CO.**

Plan to have on display one type KSC automatic reclosing circuit breaker, one type KB Urelite air circuit breaker and various molded case circuit breakers. *In charge—J. R. Chamberlain, Jr.*

• **JEFFREY MFG. CO., THE**

Continuous mining will be the theme of the exhibit. On display will be three continuous-type miners; a "Colmol" for low seams and a "Colmol" for medium-high coal, and a 34-F Mining Machine. A "Molveyor" consisting of 15-ft wheeled sectional belt conveyors coupled together for transporting coal up to 300 ft from face to main transportation will also be shown. An 81-A loader and model MT-67 shuttle car, a 6-F series "Aerodyne" fan, a Midget "Aerodyne" blower, a hand-held drill, a double roll crusher, electric vibrating feeders and belt idlers will complete the exhibit. *In charge—A. R. Anderson.*

• **JOHNS-MANVILLE SALES CORP.**

The theme of this exhibit will be how asbestos helps the coal mining industry. Materials displayed will include corrosion-resistant "Transite" pipe for mine drainage, water supply lines and exhaust ducts; packings and gaskets for slushers, pumps and similar equipment; asbestos friction materials designed to withstand the increased loads and greater speeds of machinery; and asbestos building materials for construction and fire barriers. *In charge—J. R. East.*

• **JONES & LAUGHLIN STEEL CORP.**

Plan to feature a model hearth furnace. It will be an exact replica and will run through a complete working cycle with its operations synchronized to a record of actual mill sounds. Also on display will be a J & L's line of wire rope and "Jalloy" and "Jalten" alloy steels. *In charge—A. R. Knerler.*

• **JOY MFG. CO.**

Mining systems for both high and low coal will be highlighted. Featured will be a new continuous miner with twin boring arms and shaped cutter chains, and a continuous mining system consisting of a mining machine, extensible belt conveyor and a flexible bridge conveyor. Also shown will be a modified 20-BU Loader, single unit and twin-boom hydraulic roof drills, the suspension-type "Limberoller" idler, and "Quik-Loc" electric cable connectors. Shuttle cars, mine fans, portable blowers, roof bolting stoppers, and conveyor idlers and knock down sections will round out the exhibit. *In charge—F. H. Nickerson, Jr.*

• **KANAWHA MFG. CO.**

Will use illuminated photographs to describe its line of equipment for the coal mining industry.

• **KEENAN OIL AND FUEL CO.**

Theme of the display will be reduce the cost of coal spraying. Methods for dewatering, reduction of moisture, pickup, and increased Btu valuations will be shown. *In charge—J. N. Jackson.*

• **KENAMETAL INC.**

Will show latest developments in tungsten-carbide bits for cutting and drilling. A new application of tungsten-carbide for percussion drilling, and several special applications of standard tools will be described. In addition, the company's standard line of cutting and drilling bits will be displayed. *In charge—Richard L. Farris.*

• **KENSINGTON STEEL CO.**

Will exhibit many of the improved castings the company furnishes as standard repair parts for stripping equipment, chain conveyors, preparation plant and crushing equipment. *In charge—E. C. Anderson.*

• **KERN INSTRUMENTS, INC.**

An optical type surveying instrument, for work above and underground, which is sealed against dust and moisture and provided with electrical illumination, will be featured. An optical plummet for precision vertical alignment of mine shafts will be shown for the first time. *In charge—Florian E. Davatz.*

• **KNAPP MILLS, INC.**

Plan to feature "Guidler," a hyperbolic belt control mechanism for use in guiding all kinds of belts. Available in five sizes, it has application in both conveying and power transmission fields. A metallic lead lubricant for use with all types of open gears and bearings, exposed and enclosed chains, and wire rope and cable will also be demonstrated. *In charge—William J. Smith.*

• **KOEHRING CO.**

Display will center about their 6-yd "Dumtort" hauling unit. Recent improvements in the unit will be featured. *In charge—E. J. Goes.*

• **KOPPERS CO., INC.
WOOD PRESERVING DIV.**

Will feature the economy and long life benefits of pressure-creosoted mine ties. *In charge—Merritt R. Clifton.*

• **LABORATORY EQUIPMENT CORP.**

An induction furnace and an automatic sulphur titrator will be shown. Visitors are invited to bring coal and coke samples so that the company's method of sulphur determination may be demonstrated.

• **LECCO MACHINERY & ENGINEERING CO.**

Will display a 5 by 14-ft single deck "Lecco-Vib" horizontal vibrating screen and a 20-in. by 12 ft "Lecco-Vib" horizontal vibrating conveyor. *In charge—H. G. Walker.*

• **LEE-NORSE CO.**

Will use two booths, one inside and one outside, to exhibit the Lee-Norse miner with the latest field test improvements; dry wheel friction for use in shuttle cars to protect gears, shafts and universals; and latest development in their transportation line, the Lee-Norse "Mine Portal Bus." *In charge—E. R. Phillips.*

• **LESCHEN WIRE ROPE DIVISION
H. K. PORTER CO., INC.**

Illuminated photographs will be used to feature Hercules Red-Strand wire rope. On display will be numerous samples of the various types, sizes and constructions, including a three-in. dragline rope and wire rope slings. *In charge—L. J. Clarke.*

• **LETOURNEAU-WESTINGHOUSE CO.**

On display will be the 200-hp Model C Tournatractor and the new 22-ton Model C rear dump, and the recently introduced 293-hp Model B Tournapull, with 23-cu yd scraper. *In charge—Dan Burke.*

• **LINCOLN ENGINEERING CO.**

Will have on display its new "Automated," power-drive lubrication systems. In addition, other types of centralized lubrication systems will be exhibited along with the latest developments in grease guns, fittings and accessories. *In charge—T. P. Moessner.*

• **LINK-BELT CO.**

Will highlight a new low-profile high-capacity vibrating screen especially designed for the handling and dewatering of coal. A multi-louvre dryer for reclaiming slurry from waste piles will also be displayed as well as such equipment as precision chains, anti-friction bearings and belt conveyor components. *In charge—L. O. Millard.*

• **LONG CO., THE**

Equipment for piggyback conveyor haulage including a model 88 "Pigloader," a "Piggyback" conveyor, and a Long room conveyor, will be featured. There will also be the new Long "lift-out" conveyor pan and "Superlite" chain. *In charge—J. B. Long and R. C. Nelson.*

• **LUDLOW-SAYLOR WIRE CLOTH CO.**

Will exhibit samples of industrial wire cloth in a wide variety of square and rectangular openings in both abrasion and corrosion resistant metals. Various types of hook strips and hooked edges will also be shown for use on all types of vibrator screens. *In charge—John F. Steffens.*

• **LUKENS STEEL CO.**

"Stainless-Clad" steel coal handling equipment will be the subject of the Lukens exhibit. Focal point will be a "Stainless-Clad" steel coal hopper removed from a New York State power plant for inspection and display after 9½ years of uninterrupted service. The display will point up practicability of using "Stainless-Clad" steel for coal handling equipment. *In charge—Manolo Wiechers.*

• **McLANAHAN & STONE CORP.**

Will feature a small, single-roll coal crusher and a newly designed crusher. In addition, working models, photos and other descriptive matter will be on display. *In charge—J. Craig McLanahan.*

• **McLAUGHLIN MFG. CO.**

Will display a complete line of augers, heads and cutters suitable for drilling in all phases of mining. A new type carbide drill bit and holders of various sizes will be introduced.

• **McNALLY PITTSBURG MFG. CORP., THE**

Is moving its sales and engineering offices to the Coal Show. Translites of the latest in dense media, drying and coal preparation equipment will be displayed. *In charge—C. W. Waterman, Jr.*

• **MACWHYTE CO.**

On display will be wire ropes for all mining operations, swaged fitting assemblies and Atlas braided wire rope slings for material handling. *In charge—Forest J. Nelson.*

• **MARION POWER SHOVEL CO.**

Will use photos of component parts to feature the new giant 60-yd stripping shovel now being built. Highlight of the display will be an artist's conception of the mammoth

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earth-moving machine. A complete line of Marion-Osgood-General machines will also be described. *In charge—H. E. Bonecutter.*

• **MARTINDALE ELECTRIC CO.**

Exhibit will include maintenance equipment and tools such as mica undercutters, commutator grinders and stones for work on electric motors and generators. Also featured will be electrical testing instruments including ammeters, voltmeters, ohmmeters, and electrical testing instruments. Portable blowers, industrial vacuum cleaners, wheel and gear pullers, electrical etchers, demagnetizers will also be on display. *In charge—Roy E. Blersch.*

• **MECHANIZATION, INC.**

Will present the story of coal from the mining face through the preparation plant and into the furnaces of the final consumer. Coupled to this theme will be facts and figures showing editorial coverage, penetration of readership and advertising growth of their three publications. *In charge—Raymond Coombes.*

• **MINE SAFETY APPLIANCES CO.**

Along with a complete line of safety equipment, the M. S. A. Mine Phone and the new M. S. A. "Bantam 400" Rock Dust Distributor will be featured. The rock duster will be introduced at the show, and has been designed to put rock dust through a 400-ft hose. *In charge—C. M. Donahue.*

• **MINING CONGRESS JOURNAL**

Monthly publication of the American Mining Congress invites the foot-weary visitor to "set and rest." The exhibit will feature MCJ's service to the entire mining industry. *In charge—J. C. Fox.*

• **MINING MACHINE PARTS, INC.**

Will show replacement parts representative of their manufacture. In addition to mechanical parts, mercury relay tubes and contactor control operating coils will be featured. *In charge—Jay R. Berry.*

• **MINING PROGRESS, INC.**

Exhibit will feature the Westfalia Conversion Equipment for long wall mining. A German coal plow, it differs from the original Lobbe Hobel in that it has separate drives for conveyor and plow. Return or intermediate drives can be fitted to any point of the conveyor, thus enabling plowing in faulted areas by fitting one or more additional plow bodies. *In charge—Arno Schneider-Paas.*

• **MITCHELL INDUSTRIAL TIRE CO., INC.**

Will have on display a "Mitco" tire, a laminated tire to replace pneumatic tires on present mining equipment. *In charge—A. L. Mitchell.*

• **MORRIS MACHINE WORKS**

Plan to show a two-in., Type R slurry pump for handling heavy concentrations in coal washing plants. Other pumps for handling abrasives will be featured in photographs. *In charge—W. M. Mercer.*

• **MYERS-WHALEY CO., INC.**

Plan to use enlarged photographs to highlight the Whaley Automat loading machine, for track mounted and off-track operation, and the new Whaley "Transfer Car," a crawler mounted shuttle car. *In charge—James G. Gillentine.*

• **NATIONAL ELECTRIC COIL CO.**

Will exhibit replacement coils for motors and generators. Newer types of insulating materials will be shown, along with examples of rebuilding mining equipment. *In charge—Bailey E. Price.*

• **NATIONAL MALLEABLE & STEEL CASTINGS CO.**

A complete assembly of the newest railroad coupler; the Type F interlocking coupler, with attachments; and the National multi-pad cushioning device will be shown. The Type F coupler is designed for large capacity cars used in strip mining and for tough abrasive service that such couplers find. Also on exhibit will be the Willison automatic coupler, Multi-Pad rubber cushioning devices and the NC-1 mine car truck. *In charge—H. H. Smith.*

• **NATIONAL MINE SERVICE CO.**

The Ashland Division of the company will exhibit and operate a shuttle car rebuilt in all essential requirements and converted from a non-permissible to a permissible model.

A new type battery, the Sontone storage battery, will be shown for the first time at any mining show. It features high discharge rate, quick charging, less maintenance, and long service life. Wheat automatic charging with electronically-controlled voltage regulation will be demonstrated with the new Wheat metal charging rack. Other demonstrations will include the Riken gas indicators for determining methane or other combustible gases; Permi-Seal tamping plugs and Hayden belt fastening equipment with new pre-sealed splicing. A long list of other mining accessories will round out the exhibit. *In charge—Gordon MacVean.*

• **NATIONAL TUBE DIVISION
U. S. STEEL CORP.**

See U. S. Steel.

• **NEWCOMER PRODUCTS, INC.**

A complete range of carbide of carbide tipped undercutter machine bits, drills and roof drill bits will be on display. *In charge—Charles J. Deger.*

• **NOLAN CO., THE**

Exhibit will consist of full size working models of the Nolan hydraulic Porta-Feeder, automatic mine car loading station and mine car retarder. Working scale models of Nolan gear driven rotary dumps and a new type radial screen dewatering device for preparation plants will also be shown. *In charge—C. G. Hunt and G. W. Merritt.*

• **NORDBERG MFG. CO.**

Will have on display to the coal industry for the first time the Symons V-Screen. The principles incorporated in this new screen combine gravitation and centrifugal forces for high capacity and more accurate sizing in the finer sizes. They are being used in industry for dedusting, dewatering and sizing. *In charge—J. D. Grace and W. F. Reeder.*

• **OHIO BELL TELEPHONE CO., THE**

Are going to feature various types of communication instruments and systems. They plan to combine "hands-free" telephone sets, telephone answering devices, paging equipment, switchboards, mobile telephone equipment, and integrated data processing equipment in an integrated display unit pointing up the convenience and profitable applications of the company's service. *In charge—Robert Stillman.*

• **OHIO BRASS CO.**

Featured will be a "Round Table" at which visitors can discuss roof bolting techniques with O-B engineers. An O-B coupler exhibit and a new O-B circuit interrupter will be on display as will be O-B lined materials, locomotive current collectors, rail bonds, fused trolley taps, motor starters, and other safety and control equipment for mechanized mines. *In charge—J. H. Sanford.*

• OHIO CARBON CO., THE

Will feature brushes used on motors, generators and slip rings in the mining field. Transportation will be available for those who wish to visit the company plant in Cleveland. *In charge—F. C. Aurand.*

• OKONITE CO., THE
HAZARD INSULATED WIRE WORKS DIV.

Will feature Hazacord mold-cured portable cables for all types of mining applications. Particular emphasis will be placed on the new "Red Saddle" shuttle car cable. Samples of various construction will be available for examination. *In charge—Thomas R. Weichel.*

• OLIN MATHIESON CHEMICAL CORP.
EXPLOSIVES DIV.

A representative display of Olin dynamites and blasting caps will be on exhibition. Also featured will be the Armstrong Airbreaker, a mechanical device for breaking coal down by air. *In charge—A. J. Barocca.*

• OREFRACTION, INC.

Exhibit will demonstrate the high recovery of Orefraction Magnetite when used as the heavy media in magnetic coal washing systems. *In charge—A. L. Kreuer and Harry Jamison.*

• OSMOSE WOOD PRESERVING CO. OF AMERICA, INC.

Will display a model of the Osmose pressure treating plant. Photos, timber specimens and other Osmose products will also be shown. The exhibit will be rounded off with complete files on mine timbers and ties, and a description of Osmose processes and services. *In charge—Joseph M. Bray.*

• PAGE ENGINEERING CO.

Will feature a lounge with plenty of chairs to rest in and a phone for the convenience of visitors. Movies and slides of the latest Page Engineering Walking Dragline Machines and heavy duty coal stripping buckets will be shown. A medium sized bucket will be displayed to acquaint visitors with the latest features in the Page Automatic Dragline Bucket line. *In charge—Theodore C. Beng.*

• PATTIN MFG. CO.

Plan to show the various sizes and styles of roof bolts, plate washers and expansion shells it manufactures. Featured will be the "D-2" expansion shell which is designed to eliminate the possibility of the wedge nut being pulled through the shell in soft roof. *In charge—Jack B. Dempsey.*

• PENN MACHINE CO.

The company's comprehensive line of quality replacement parts for all types of cutting, loading and haulage equipment will be on display as will the Everlast super-weld rail bonds. There will also be testing machines in operation. *In charge—S. Guy Little.*

• PETERSON FILTERS & ENGINEERING CO.

Will feature a Peterson Pilot Plant with an all stainless steel Disc filter and a full size operating filter gear case unit. Enlarged flowsheets illustrating the Peterson screen-filter system for dewatering fine coal and fine refuse will be available. *In charge—Bob Mattison.*

• PITTSBURGH SCREW & BOLT CORP.

On display will be a complete line of fasteners manufactured for use in the coal industry. Emphasis will be given to roof bolts and their component parts. Data showing the comparative physical properties of $\frac{1}{2}$ -in. and $\frac{3}{4}$ -in. bolts will be available. *In charge—William J. Francis.*

• POST-GLOVER ELECTRIC CO., THE

Electrical equipment for a wide variety of mining uses will be on display. These include resistors, grid type starters, automatic transfer switches, reel motor contactors, manually operated switches, welders, and electric heaters. *In charge—R. W. Houpp.*

• PRODUCTIVE EQUIPMENT CORP.

Will have a standard 4 by 10-ft double-deck open-suspended "Gyroset" vibrating screen on display. These screens are designed for wet or dry sizing as well as for dewatering coal and refuse. *In charge—L. H. Lehman.*

• PROX CO., INC., FRANK

Exhibit will highlight the company's line of cutter chains, throwaway bits, sprockets and cutter bars. *In charge—Charles J. Forbes.*

• PURE OIL CO., THE

Will feature by means of revolving panels a display of multi-service oils and greases. The theme of the exhibit will be "Simplify and Save." *In charge—Paul Messinger.*

• QUAKER RUBBER CORP.
DIVISION OF H. K. PORTER CO., INC.

Exhibit will feature a model descending conveyor. *In charge—W. H. Pender.*

• RAYBESTOS-MANHATTAN, INC.
MANHATTAN RUBBER DIV.

An underground mine conveyor will be in operation with a new type belt. Various types of conveyor belt for heavy duty service will be on display as will a variety of trolley guards. *In charge—D. H. Cottrille.*

• REICH BROS. MFG. CO.

Will have on exhibition an extra heavy-duty truck-mounted blast hole drill capable of drilling a 7 $\frac{1}{2}$ in. diameter hole in hard rock. *In charge—Wendell L. Reich.*

• RELIANCE ELECTRIC AND ENGINEERING CO.

Will feature examples of their completely new line of industrial d-c motors. New Reliance Totally-Protected a-c Motors will also be on display. Examples of Reliance-built mining motors for underground and surface operations will be shown. A renewal parts "bar" will also be part of the exhibit. *In charge—Robert L. Williams.*

• REPUBLIC STEEL CORP.

Exhibit will feature products recently developed to meet specific needs of the mining industry. Roof bolts will be featured as will Republic Plastic Pipe. Also displayed will be Republic customer products made from stainless steel. *In charge—J. K. Bole, Jr., and H. M. McDaniel.*

• ROBERTS & SCHAEFER CO.

Exhibit will consist of display material—pictures and graphic representations of equipment—with service facilities for visitors and guests. Lounge chairs and a check room will be provided. *In charge—Wm. C. McCulloch.*

• ROBERTSON CO., H. H.

Will feature "Galbestos" roofing, siding, ventilators and lightweight insulated metal wall construction. Galbestos products are salvageable for re-erection and can be installed during cold weather.

• ROEBLING'S SONS CORP., JOHN A.

Will display for the first time the company's new line of Royal Blue wire ropes. Latest constructions in electrical wire and cable for mining, including a new and improved parallel twin mining machine cable, will also be shown.

COAL SHOW

• **ROME CABLE CORP.**

Display will feature Rome 60 Neoprene sheathed mining cables. Focal point of the exhibit will be a mock-up of a parallel duplex shuttle car cable. *In charge—Dwight Thayer.*

• **RUST-OLEUM CORP.**

Will demonstrate the rust prevention properties of Rust-Oleum with on the spot demonstrations. *In charge—Robert A. Fergusson.*

• **SALEM TOOL CO., THE**

Plans to exhibit the new McCarthy underground coal recovery drill. The model will use 30-in. augers and bore 33-in. holes. Rounding out the exhibit will be a display of horizontal and vertical highwall drills and a photographic presentation of various new models including air driven auger drills. *In charge—V. J. McCarthy and J. H. Wilson, Jr.*

• **SANFORD-DAY IRON WORKS, INC.**

Will have an exhibit in conjunction with the Brown-Fayro Division of the company. A cutaway section of an up-to-date automatic drop-bottom car along with jerkout unlatching device and closer will be shown, as will a plastic model of the S & D outside frame construction Granby type car. A model drop-bottom car dumping facility will also be shown. The Brown-Fayro Division will have a new type barge and railroad car mover wired for operation. Also shown will be HKI hoist, and Oil Spray Equipment.

• **SCHROEDER BROS.**

Will combine with the W. R. Stamler Co. in exhibiting automatic hydraulic car spotting and car loading equipment, hydraulic coal drills, hydraulic power units, hydraulic test equipment, hydraulic filter equipment and hydraulic devices and controls.

• **SHELL OIL CO.**

An audience participation display will be used to point up industrial lubricants. All Shell products will be emphasized, including "Alvania" grease, a multiple purpose grease; "Rotella" and "Rimula" oils, heavy duty engine oils for severe lubrication problems; and "Tellus" oils, for efficient power. *In charge—C. Seelbach.*

• **SIMPLEX WIRE & CABLE CO.**

Will feature the standard line of Simplex-"Tirex" cables as well as the new, extra-flexible Tirex cords. In addition, Simplex will have its "Anhydrex" cables in both low and high voltage construction on display. *In charge—H. E. Murchison.*

• **S K F INDUSTRIES, INC.**

Will have on exhibit a complete line of S K F anti-friction bearings and pillow blocks. Highlighted will be a line of pillow blocks and flanged housings with a sealing design to prevent dirt from entering the bearing. *In charge—E. H. Wagner.*

• **SOCONY VACUUM OIL CO., INC.**

Plan to exhibit their products for use in the mining industry. *In charge—R. J. Harto.*

• **SNAP-ON TOOLS CORP.**

Exhibit will include industrial sockets for powered impact guns and nut runners, electric impact wrenches, special diesel engine tools, and a wide range of standard and special maintenance tools. *In charge—Milton B. Steinmetz.*

• **STAMLER CO., W. R.**

See Schroeder Bros.

• **STANDARD OIL CO. (INDIANA), THE**

Featured will be Standard's research technical service and its supply facilities. Lubrication engineers will be available to discuss lubrication problems. *In charge—R. D. Dalmeyer.*

• **STANDARD OIL CO. (OHIO), THE**

Sohio will demonstrate the properties and characteristics of a new "Sohitac" series of open gear and wire rope lubricants. Working demonstrations will be used to show the adhesive, water resistance, and load and shock carrying properties of the lubricants. *In charge—M. S. Obenauf.*

• **STEARNS MAGNETIC, INC.**

Will have on display their new Wet Permanent Magnetic Drum Separator for use in heavy density plants for media recovery. It will be in operation. Cutaway models of the company's new line of magnetic disc brakes will also be shown. *In charge—D. F. Christnelly.*

• **TEMPLETON, KENLY & CO.**

A complete range of models of mechanical and hydraulic jacks and pullers will be exhibited and demonstrated. These will include the Jenny Center-Hole hydraulic pullers, hydraulic center-hole and solid rams, foot lift hydraulic jacks, and new models of Simplex mine jacks especially designed for the mining industry. *In charge—N. L. Montgomery and W. D. Boldt.*

• **TEXAS CO., THE**

Texaco industrial lubricants will be featured. Available literature will demonstrate the proper use of lubricants in the mining industry. *In charge—H. W. Yarrington.*

• **TIMKEN ROLLER BEARING CO., THE**

Display will feature both Timken Bearings and Rock Bits. Miniature mine sequences will be shown in panel form depicting the application of both the Timken bearings and bits in the mining industry. A photographic display will show Timken equipped mining equipment together with the bearings actually used in that particular machine. Samples of all sizes of bearings and rock bits used in the mining field will also be shown. *In charge—S. C. Partridge.*

• **TOOL STEEL GEAR & PINION CO.**

Included in the exhibit will be cutaway samples of various types of products the company makes for the industry. A seating area will be provided where visitors can rest.

• **TRABON ENGINEERING CORP.**

Will feature fully automatic lubrication systems for all types of underground mining equipment. Lubricant pumps will be hydraulically operated or air operated from the machine being lubricated. In addition, fully automatic lubrication systems for all types of tipples, conveyors and cleaning equipment will be in operation. *In charge—Thorn-ton Lake, Wayne Ritter and Lee Riggs.*

• **TRI-COUNTY BUILDING SERVICE**

Description not available.

• **TWIN DISC CLUTCH CO.**

On display will be hydraulic products and friction clutches with special emphasis on hydraulic lines. A full scale plastic working model of a three-stage torque converter will be shown along with fluid couplings and fluid power take-offs. Cutaways of friction units will also be on display. *In charge—G. W. Upp.*

• **TYLER CO., THE W. S.**

A 5 by 12-ft double-deck "Ty-Rock" vibrating screen will be featured. Also on display will be "Ro-Tap" testing sieve shakers and Tyler standard screen scale testing sieves

along with a large selection of woven wire screens. *In charge—H. F. Lawrence.*

• **UNION WIRE ROPE CORP.**

Exhibit will feature special purpose ropes for use on such equipment as draglines, scrapers, dozers, hoists and slings. *In charge—L. A. Price.*

• **UNITED ENGINEERS & CONSTRUCTORS, INC.**

Will have on display a panel showing the Chance Cone coal cleaning process in action by a series of moving lights. *In charge—William Connelly.*

• **UNITED STATES RUBBER CO.
MECHANICAL GOODS DIV.
ELECTRIC WIRE AND CABLE DEPARTMENT**

Will feature products to meet the needs of the coal mining industry. Included in the exhibit will be Super Ustex-Nylon Conveyor Belting, U. S. Royal Gold Mining Machine Cable, and the new Royal Master Portable Cord. *In charge—H. E. Dadson.*

• **U. S. STEEL CORP.**

Will feature a brand new mine car manufactured from Cor-Ten steel. Shown with the car will be an extra set of trucks showing the newest in U. S. Steel design. A photographic display will show the many applications of Man-Ten, Cor-Ten, Tri-Ten and A-R Steel. Stainless steel roofing and siding will be shown along with stainless steel coal screens and stainless wire of various kinds. Another part of the exhibit will feature T-1 Steel as it applies to the mining industry, along with a motion picture showing the T-1 Steel tests. *In charge—J. B. Hargus.*

• **U. S. STEEL SUPPLY DIVISION
U. S. STEEL CORP.**

See U. S. Steel.

• **VAREL MFG. CO.**

Varel Rotary Cone-type and Blade-type drilling bits and related items will be featured. In an outside booth, a model 540-A Varel "Jet-Rig" will be displayed showing the air rotary drill designed especially for holes up to 7½ in. in diameter. *In charge—T. Jack Brown.*

• **VASCOLOY-RAMET CORP., THE**

Will exhibit a complete line of chain cutter bits, auger bits, finger bits and roof bits. Three new roof bits for various drilling service will be shown for the first time. *In charge—R. Moore.*

• **VICTAULIC CO. OF AMERICA**

The exhibit will feature the Victaulic method of piping. Standard couplings, snap-joints, lightweight couplings, full-flow fittings and "Vic-Groover" portable tools will be shown. "Roust-A-Bout" couplings for plain end pipe will also be shown. *In charge—Dick English.*

• **WARREN REFINING & CHEMICAL CO.**

Description not available.

• **WATT CAR & WHEEL CO., THE**

Will have easy chairs for the comfort of Convention-goers as well as photographs and descriptive literature of its line of products. *In charge—Bob Edgar.*

• **WEATHERHEAD CO.**

Description not available.

• **WEDGE WIRE CORP.**

Will have on display its line of Kleenslot Wedge Wire screens in different opening sizes, profiles and metals. Featured will be their new marcel Wedge Wire. *In charge—W. E. Bizby.*

• **WELLMAN CO., THE S. K.**

All metal clutch discs, brake linings, facings and clutch plates for use on loaders, shuttle cars, cutting and slabbing machines and conveyors will be on display. *In charge—J. F. Felbinger, W. O. Knight and E. E. Gassen.*

• **WESTERN MACHINERY CO.**

Will display commercial size units of a coal spiral, HMS drum separators, Fagergren flotation cell, a cutaway commercial model of the Torque Flow solids pump, and a transparent lab size working model of the Torque Flow solids pump demonstrating solids handling. Working flow-sheets of coal cleaning plants will also be on display. *In charge—Wm. F. Haddon.*

• **WESTINGHOUSE ELECTRIC CORP.**

Intend to have as their feature attraction a model of an atomic power plant. It is presented to coal mining people on the basis that the Atomic Energy Commission is one of its best commercial customers. A complete line of explosion-proof motors and controls for underground use, gear motors as well as gearing, a sealed nitrogen filled mine power center, and ignitron portable rectifier equipment will also be on display as well as a complete line of industrial type motors and controls. *In charge—R. L. Killebrew.*

• **WEST VIRGINIA STEEL & MFG. CO.**

Will introduce its new "Wedgegrip" expansion unit for roof bolt anchorage. Also on display will be the company's "Fingertype" and "Standard" expansion units. A full line of roof bolts in ½, ¾ and 1-in. sizes will be on display. Featured in connection with a few standard trackwork items will be fence posts and concrete reinforcing bars suitable for mine property. *In charge—J. B. Haskell.*

• **WHITNEY CHAIN CO.**

The complete line of Whitney Mine Service Chains, including universal joint chains, shuttle car chains, continuous miner chains, special flights and special chains for power transmission and conveying will be displayed. Featured will be a universal joint mine chain, pre-packed in standard chain units for speeding up maintenance and repairs. *In charge—Paul Pyle.*

• **WILD HEERBRUGG INSTRUMENTS, INC.**

Plan to exhibit a full line of Swiss-made optical surveying equipment. Featured will be the T-1 optical repeating transit, an internally illuminated transit with a built-in optical plummet which allows setting up without a plumb-bob. Mining attachmens, including a 90° pentagonal prism for shaft plumbing, will also be shown. *In charge—H. P. Tanner.*

• **WILMOT ENGINEERING CO.**

A new line of coal preparation equipment will be featured. Main attraction will be the "OCC" heavy media vessel. A laboratory model with ½-ton feed capacity will be available for inspection as will a small hand-operated model vessel for demonstrating its principles of operations. *In charge—H. R. Middleton.*

See the Latest in Mining at the AMC Coal
Show, May 16-19



Utah Copper Division normally provides about 30 percent of newly mined copper in the United States

Modernization of Magna and Arthur Mills

**Revised Flotation Flow Scheme Improved Recovery
of Copper, Molybdenite, Gold and Silver at One of
World's Largest Copper Producing Units**

By P. H. ENSIGN

General Supt. of Mills
Utah Copper Div.
Kennecott Copper Corp.

ON September 28, 1952 a button was pushed starting the first row of new flotation machines installed in the Arthur copper flotation plant, thus bringing into operation the fruits of more than two years of intensive, detailed, testing which had been preceded by several years of preliminary exploration. A similar start-up occurred at the Magna Plant seven months later.

It is proposed here to review test work conducted; installations of flotation machines selected as a result of such test work; and performance of these machines as they are incorporated in a revised flotation flow-scheme.

Because of increased power demands made upon an outdated electrical system by the new flotation process, it became imperative to launch a program of expansion and modernization of electrical facilities at the Arthur and Magna Plants. A

brief discussion of this program—interlocked with the flotation program—is included.

Utah Copper Division of Kennecott Copper Corp. is one of the world's largest copper producing units. It has a productive capacity of more than 500,000,000 lb of copper per year. Normally, it provides about 30 percent of the newly mined copper in the United States and approximately ten percent of the world's reported primary production.

Milling operations include two concentrators—the Arthur and Magna Mills. Each has a normal capacity of approximately 40,000 tons of ore per day. However, good efficiencies have been realized treating tonnages up to 50,000 tons daily.

Ore is delivered to the Mills from the open pit mine in Bingham Canyon, Utah, via a 14-mile railway. Over this Mine-to-Mill ore haulage system approximately 80 cars each

loaded with 90 tons of ore can be handled in a single train powered by two 125-ton, 3000 v electric locomotives operating as a single unit.

Utah Copper's ore body is of the type generally known as a "porphyry copper." Chalcopryrite, chalcocite, covellite and bornite are the chief copper minerals present, with chalcopryrite predominating. These occur with pyrite disseminated in the somewhat shattered, highly altered, "monozonite" porphyry. Feed to the Concentrators typically contains 0.920 percent copper; 0.060 percent molybdenite; 0.020 ounces per ton—gold; 0.125 ounces per ton—silver. Platinum and palladium are recovered in the refinery in relatively "minute quantities."

In the Arthur and Magna Concentrators a series of crushing, grinding and classifying units reduce the ore to sizes amenable to separation by flotation. This consists of a bulk flotation of all products recovered, followed by a differential flotation separation of the copper and molybdenite minerals. Gold and silver are recovered in the final copper concentrate. Pyrite is depressed into the copper plant tailing.

The concentrate produced in the copper flotation plant typically assays as follows:

Copper	31.00 percent
Molybdenite	1.80 "
Insoluble	16.00 "
Iron	21.00 "
Sulphur	28.00 "
Gold	0.50 oz. per ton
Silver	4.00 " " "

This concentrate is delivered to the Molybdenite Recovery Plant where initial separation of the copper minerals and molybdenite is accomplished through dextrine depression of the latter.

During the years from 1937 to 1947, laboratory and plant experimental flotation work had been conducted with the purpose of improving molybdenite recovery in the copper flotation circuits of the two concentrators. Many different reagents and combinations of reagents were tried. Results invariably proved that any reagents incorporated into the copper circuit and found beneficial to molybdenite recovery would adversely affect the recovery of copper. In addition any such reagent would carry into the copper concentrate and interfere with the depression of molybdenite by dextrine.

Continued testing pointed to the retreatment of copper plant tailing as the solution to the problem of improving molybdenite extraction. This method would not interfere with copper recovery and would permit the use of any reagent specific to molyb-

denite flotation. Retreatment further provided a method of increasing the yield of copper, gold and silver. Also, the tonnage of concentrate produced by the retreatment section would be low enough to permit its being circulated around the molybdenite depressing float, thus solving another of the problems.

Experimentation, therefore, was directed toward the development of a copper plant tailing retreatment scheme.

Test Work—Arthur Plant

In September 1947, testing was transferred from the laboratory to the Arthur copper flotation plant. This plant was selected because it was in the process of renewing the worn out steel flotation machines then in use and it was known that any developments at Arthur could be applied, generally, to the Magna Plant.

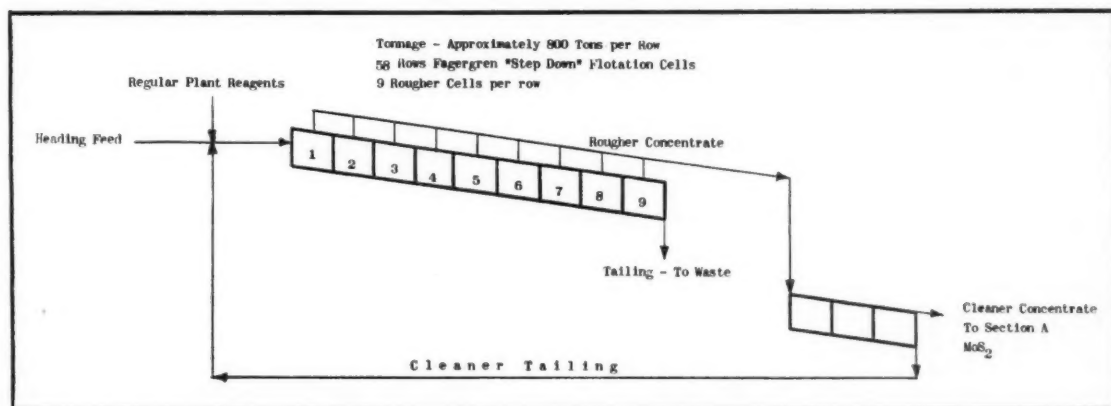
Since 1937 the Arthur copper flotation plant had consisted of 58 rougher rows, each row comprised of nine Fagergren 56-in. stepdown type flotation machines. The rougher concen-

trate produced by these 58 rows was single cleaned in a separate cleaning plant with the cleaner tailing being circulated to the head of the rougher circuit.

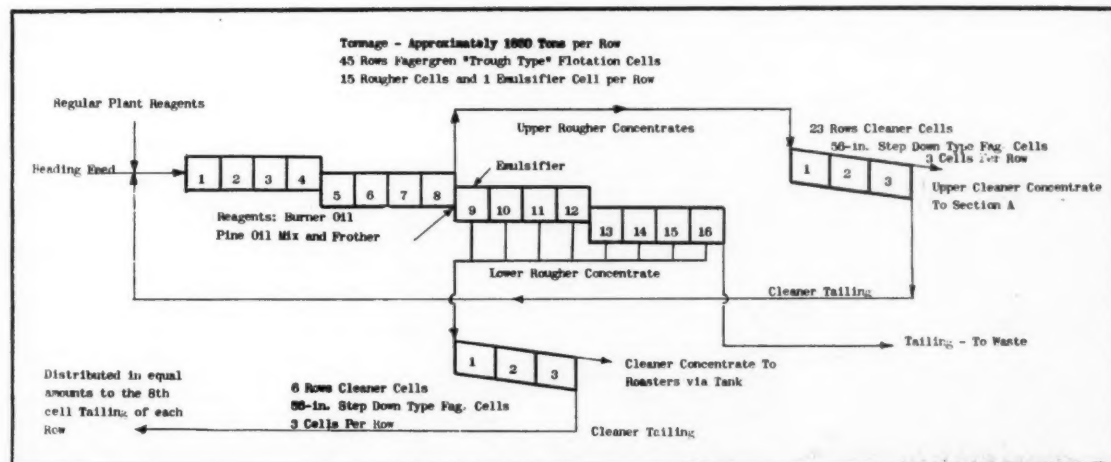
Regular plant rows were employed as experimental rows. In effect, an 18-cell row was set up in which the last nine cells acted to retreat the tailing from the first nine cells. The metallurgical data obtained was compared to corresponding data from a nine-cell row. Variations applied to the experimental retreatment row were evaluated and optimum operating conditions determined.

Retreatment Feasible

As a result of this test work it was established that a retreatment process would be feasible and that such a process should embody 58 rows with each row made up of 18—56-in. Fagergren stepdown type flotation cells or machines—the last 9 cells, preceded by an emulsifier cell, to be operated as a retreatment section to which would be added molybdenite activating reagents.



Arthur flotation plant—old installation



Arthur flotation plant—new installation

The retreatment process, judged by test work, indicated that, of the values remaining in the copper plant tailing, approximately 18 percent of the copper and 60 percent of the molybdenite would be extracted. Appreciable amounts of gold and silver also would be recovered.

The retreatment process actually doubled existing copper flotation facilities. The problem now was to determine whether the present building area could be adapted to accommodate the expanded flotation plant. Engineering studies proved the existing plant could not be so adapted and that additional building space would be quite costly.

Investigation then turned to exploring the possibility of using flotation machines of different design or size that could be adapted to the existing building area and at the same time measure up to the retreatment metallurgy.

Testing progressed along these lines for several months during which time trough type and larger stepdown type machines were used in varying numbers to treat the tailing produced on a nine-cell Fagergren 56-in. stepdown type row. In each instance overall metallurgical results were compared to corresponding results made on an 18-cell retreatment row. With the exception of type of machine, all factors were identical in each test row.

Extend Experiments

From this point experimental work was gradually extended to include the larger trough type and stepdown type machines in the treatment of regular copper plant headings. This was a departure from previous work in that, up until this time, testing had been concerned with retreatment of copper plant tailing. This latest move, if successful, had the advantage of

TABLE I—Arthur Plant

	18-Cell 56-in. Fagergren Row	15-Cell 62-in. Fagergren Row
Daily Tonnage	812	1048
Indicated Recovery		
Copper—Percent	94.39	94.38
Molybdenite—Percent	87.57	87.51
Gold—Ounces per ton of Heading	0.0136	0.0138
Silver—Ounces per ton of Heading	0.1106	0.1116

further conserving building space as well as fitting in satisfactorily with plans—then currently in effect—of renewing worn out flotation machines.

Test rows were set up accordingly. Obviously a greater number of cells were included in the test rows than when treating tailing alone due to the necessity of providing sufficient capacity for both normal copper plant flotation and the tailing retreatment process.

Again, an 18-cell Fagergren 56-inch stepdown type row was simultaneously operated as a standard retreatment row and all metallurgical results were compared.

From this last series of tests, begun in April of 1952, it was evident that a large trough type flotation machine could be developed that would treat necessary mill tonnages; fit into available floor space; and at the same time produce metallurgical results equal to those produced by the 18-cell retreatment row.

After considerable study, it was decided to adopt the Fagergren 62-in. trough type machine at the Arthur Plant. This so-called 62-in. machine deviates from the standard 66-in. cell in that the trough was narrowed four in. to enable the machine to be installed in available sectional floor space.

Table I lists comparative data ob-

tained on the Fagergren 62-in. test row and the Fagergren 56-in. test row—the latter serving as the retreatment process row.

Work on installing 45 rows of new copper flotation began September 11, 1952, the first row being placed in operation on September 28. Since then one row was started up every 6.35 days until the day of completion on July 1, 1953. Installation of six rows of 56-in. stepdown scavenger cleaner cells kept abreast, as needed, of the 45 rows of rougher machines.

The average grade of cleaner concentrate produced in the scavenger or retreatment circuit contains 7.5 percent copper, 4.5 percent molybdenite, 17.0 percent iron, 50.0 percent insoluble, .28 oz per ton of gold and 1.4 oz per ton of silver. The scavenger cleaner concentrate amounting to approximately 56 tons per 24 hr, dilutes the normal copper concentrate to the extent of about 1 percent copper. The ratio of concentration in the retreatment circuit is 715 as compared to 36 in the copper circuit. The above typical figures are based on milling approximately 41,500 tpd.

The new Arthur copper flotation plant embodying the retreatment process has lived up to every expectation. It has not been necessary to increase operating personnel, additional reagent requirements have been minor, maintenance costs are not expected to be excessive and operational difficulties have been few. It has however, been necessary to enlarge the capacity of the Molybdenite Recovery Plant to efficiently treat additional loads resulting from increased molybdenite recovery in the copper plant.

Test Work—Magna Plant

Earlier in this paper it was stated that any developments at the Arthur Plant could be applied, generally, to the Magna copper flotation plant. The same problem of limited space confronted Magna as it did Arthur. Whereas, at Arthur, worn out steel cells were being replaced with concrete cells at the time new machines were being contemplated, no such condition existed at the Magna Plant. The Magna copper flotation plant had been constructed of concrete machines or cells in 1935 which had been kept in excellent repair and to replace



Arthur plant 56-in. step down Fagergren flotation machines



Expanded copper flotation plant at Magna

these concrete cells with another type would be very expensive and arduous.

Thinking, therefore, was channeled into developing a copper plant tailing treatment process employing an addition to each existing row—and confining such addition within a limited floor area.

The Magna copper flotation plant prior to installation of the retreatment process, consisted of 56 rougher rows, each row comprised of 10 Fagergren 56-in. stepdown type flotation machines or cells. Each row was equipped with one cleaner cell which cleaned the combined concentrate produced on the first five rougher cells. The combined concentrate produced on the second five rougher cells was a middling product which, together with the cleaner tailing, was circulated to the head of the rougher circuit.

Test work, therefore, was concentrated on evaluating different flotation machines very similar to Arthur's test pattern. Each machine variation acting as a scavenger, or additive unit, to a regular plant row and each unit treating copper flotation plant tailing. As is standard practice in all test work, reagents, cleaning and circulating circuits, sampling, etc., were essentially the same in all units—the only variable being the machine unit itself.

After due consideration of all factors it was decided to install the Fagergren 62-in. trough type additive unit consisting of one emulsifier cell and five scavenger cells contained within a common trough. A scavenger cleaning plant was provided to single clean the rougher concentrate produced on the retreatment unit. Six 3-cell rows of Fagergren 56-in. stepdown type cells comprise the scavenger cleaner plant.

Work on adding retreatment units to each of the 56 rougher plant rows—including 2 experimental rows—began in November 1952, the first

unit being placed in operation on April 27, 1953. Since this date on the average of one unit was completed every 4.6 days until December 20, 1953 when the last unit was placed in operation. Installation of the scavenger cleaner plant kept pace, as needed, with the rougher scavenger cells.

Metallurgical advantages indicated by test work to be realized through operation of the retreatment process were (1) copper recovery increased from 92 percent to 93 percent; molybdenite recovery raised from 78 percent to 89 percent. These approximate recovery increases translated into percentages of values extracted from plant tailing show that of the values remaining in the copper plant tailing 10 percent of the copper and 48 percent of the molybdenite would

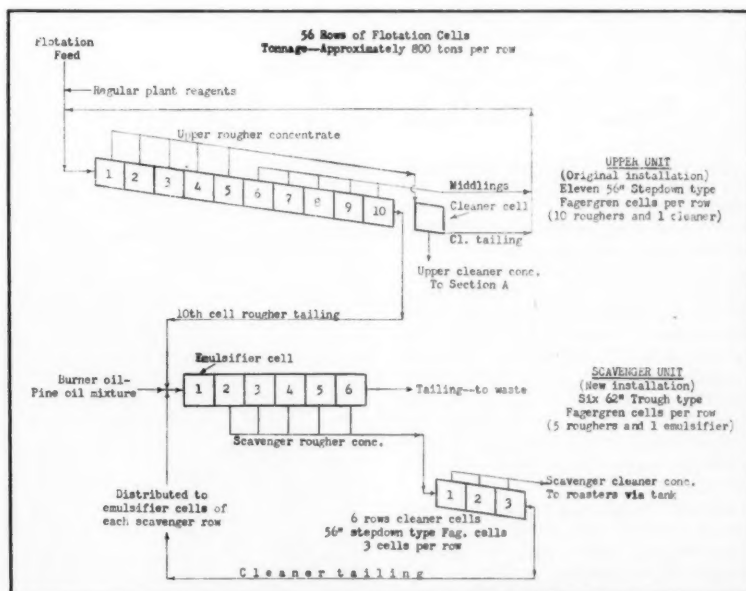
be recovered. Additional quantities of gold and silver were also recovered.

Retreatment A Success

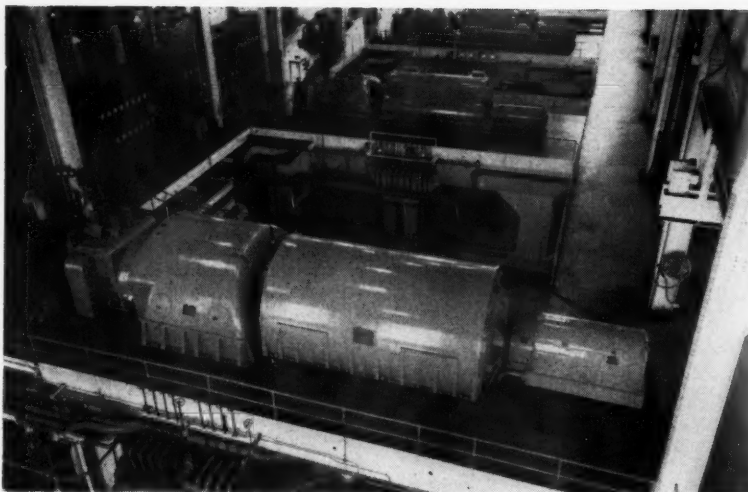
There is no question concerning the practicability of the flotation expansion program at Kennecott's Arthur and Magna mills, embodying as it does the retreatment of copper plant tailing previously discharged to waste. A fair percentage of mineral values contained in the wasted tailing are now being recovered at very little additional cost. Retreatment has been a success. However, the process is by no means perfected. It is only natural that a major change of one part of the plants, such as the one under discussion, would upset the performance of following operations. In this case the balance between the copper section and the molybdenite sections was disturbed. As rapidly as possible the proper balance is being restored, by modifications and enlargements of the molybdenite sections. Also the parallel performance of the two concentrators has been upset to some extent, and this also is being corrected as rapidly as possible. All in all, however, the adoption of the new flow sheets has resulted in slight increases in recovery of all metals and a substantial increase in recovery of molybdenite. As mentioned earlier the final concentrate grade is lower in copper content by 1% and the insoluble content is slightly higher.

Modernize Power System

Interlocked with the Mills' flotation program was a program of modernizing an outdated electrical system.



Addition of scavenger unit to Magna flotation plant improved recovery



Central power station has 100,000 kw installed capacity, supplies all power for mining, milling, haulage and refining

The original power system dates back more than 40 years and at that time was designed to adequately supply power for milling tonnages up to 6000 tpd.

As the trend toward additional power continued (Fig. 4) it became more and more evident, through system failures, that then existing electrical facilities were inadequate. A decision was made, in 1950, to completely abandon the original system and replace it with a new up-to-date distribution system. Additional power requirements of the expanded flotation program was a contributing factor.

In the new system, power is received from the central power station—a modern steam plant located within the Magna Plant boundaries and completed in 1948. This Station has an installed capacity of 100,000 kilowatts with a maximum capacity of 121,000 kilowatts and supplies all power requirements for mining, milling, ore haulage and refining operations.

The primary system serves the entire plant while the secondary system is typical of one of 12 units. Arthur's new electrical installations essentially duplicate Magna's.

Power is received at the Primary Substation from the Central Power Station at 44,000 v. Four 10,000 KVA, three phase transformers step the voltage down to 13,800 v. Adjacent to each of the four 10,000 KVA transformers is a 46,000 v. oil circuit breaker. As shown in accompanying picture both transformers and circuit breakers are located outside and atop the primary substation.

Located inside the primary substation is a metal clad, 13,800 v., switchgear divided into two groups by means of a bus-tie breaker. This switchgear controls the 13,800 v. primary feeders to Unit Substations

which constitute the junction for the primary and secondary systems.

Primary feeders emanating from the 13,800 v. switchgear consist of three single conductor cables in conduits, each cable terminating at a Unit Substation, there being 14 such Substations to serve mill sections and auxiliaries.

Units Placed Carefully

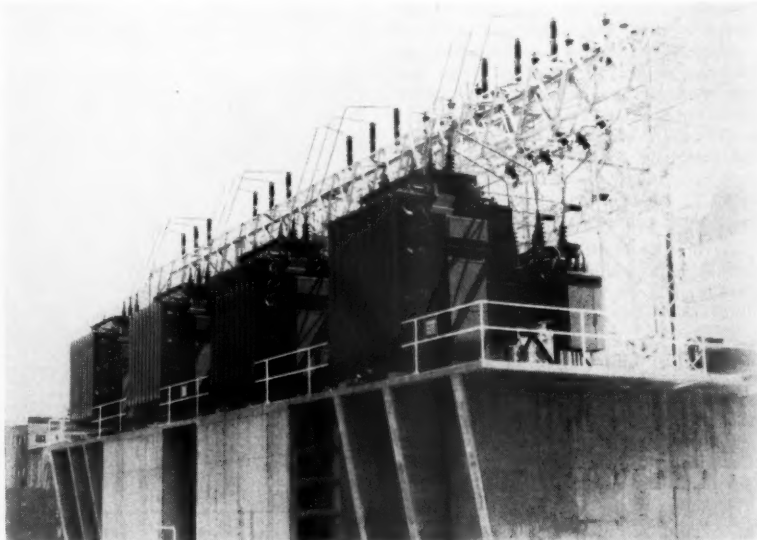
Unit Substations transform power from 13,800 v. to 480 v. through 2500 KVA, three phase transformers. Included in each Unit Substation besides one 2500-kva transformer, is one 4000 amp 600 v. secondary air circuit breaker and six 1200 amp feeder circuit breakers. Twelve of the 14 unit substations serve a like number of fine crushing and ball mill

grinding departments as well as flotation sections. The remaining two unit substations—set up as one double ended station—furnish 480 v. power to the Coarse Crushing Department, Repair Shops, Foundry and other miscellaneous equipment.

Flotation, 480 v., feeders terminate in load centers, all metal clad and remotely operated. Each load center contains eight combination line starters from which three-conductor cables lead to each 15-hp, 1800 rpm flotation motor. Each motor is provided with a disconnecting device to facilitate motor and mechanism replacement. Push button control consoles are mounted adjacent to load centers where flotation operators are afforded an unrestricted view of all motors. Starting and stopping of motors on each flotation section is accomplished from one centrally located console panel eliminating the need of traveling from one motor to another. Push buttons are arranged on consoles in eight rows of 16 buttons each.

Location of the various component equipment parts of the modernized electrical system have been carefully chosen so as to be as close as possible to the concentration of power load. In the instance of unit substations approximately 70 percent of the total power load is located within 300 ft of the Substation thereby assuring minimum voltage drop and losses.

It can be said that the new electrical distribution system, ultra modern in every detail, embodies not only electrical advantages over the old system, but provides the features of flexibility and sectional isolation which permits constancy of milling operations so necessary to maintain metallurgical efficiency.



Four 10,000 kva transformers at Primary Substation step voltage down from 44,000 13,800 volts



Development of the rubber-tired shuttle car opened a new era in mechanical mining

Shuttle Car Haulage

A Comprehensive Analysis of How Shuttle Car Gathering Fits in With Three Different Types of Main Line Haulage

By **W. L. HUSK**
Chief Engineer
West Kentucky Coal Co.

CONVENTIONAL is the adjective applied to the most popularly accepted method of mining during any specific period. Today, the term applies to the use of mechanical units for preparing, loading and transporting coal from the face to whatever equipment is being used for main line haulage. It is used to differentiate between the hand loading of yesterday and the continuous mining of the future.

Tomorrow perhaps continuous mining will be spoken of as conventional. There was a period, from 1920 until 1940, when nearly all the equipment now used in conventional mining was developed (on track). We are now in a transitional period during which the continuous miner of the future is being developed. Between the time when mechanical mining was finally recognized as "the conventional system" and the time when continuous mining will be quite common has every appearance of being so short that it might well be merely a part of the transition from hand loading to fully automatic, continuous mining.

Perhaps conventional mining will never be entirely supplanted, for there are almost certain to be always seams which will require blasting for removal. Although the development of suitable continuous mining machines progresses rapidly, conventional mining may be the method used to recover a major part of the world's coal supply for many years to come.

All equipment now used in conventional mining was developed for track operation and was known and used back in hand loading days with the exception of the rubber-tired shuttle car. The role of the rubber-tired shuttle car is reminiscent of the part the steam engine played in the Industrial Revolution. It opened wide the door to the development of conventional mining methods, and the mining industry was able to expand quickly and produce an astonishing tonnage of coal during World War II.

In the future, whether coal is prepared and loaded by conventional mining or by continuous mining, the shuttle car will continue to be a very important tool.

The Conventional Mining Unit

The conventional mining unit, in general use today, is composed of a few basic elements. It is a basic unit, established over a period of years throughout the industry by the development of a definite face cycle, systems of mining peculiar to and necessary for its use, safety rules for its protection and the working out of special labor rules between management and labor.

A universal cutting machine operated by	2 men
A coal drill operated by	2 men
A loading machine operated by	2 men
Two shuttle cars operated by	2 men
Shooting by	1 man
Mechanic-electrician	1 man
Loading point man	1 man
Foreman, room boss or face boss	1 man

Basic crew size 12 men

This theoretical unit may have attached to it additional men for timbering or roof bolting. The number added will depend upon roof conditions, but it is usually two. Such a unit may produce from 300 to 700 tons per shift, depending upon seam conditions.

There are certain seams in the country where good roof and good bottom conditions, thick coal, etc., allow ample extraction with very little difficulty. It is in some of these seams that high tonnages are reached. The loading machine may be capable of loading 1000 tons per shift but the cutting machine, the drill or the shooter may not be able to prepare over 600 tons per shift. A second element of the unit is added or even a third or a

fourth may be used so that ample coal can be prepared for the loader. The unit strength may be increased to 20 or 22 men. In a 66- to 84-in. seam from 600 to 1000 tons of coal may be produced per shift.

On the other hand, there are other seams, usually thin, with very bad conditions, where a minimum number of places are worked and where the production of the entire unit is geared to that of the lowest rated element of the unit by having some of the men operate more than one element of the cycle. Five or six men compose the crew, and production may range from 150 to 300 tons per shift in 36- to 48-in. coal.

The basic unit is flexible enough to fit nearly all mining conditions, yet the productive capacity per man varies considerably less than the productive capacity of the units. Capacity per face man may vary from 30 to 50 tons per shift (exclusive of timbering, supply handling, etc.), while capacity per unit varies from 150 to 1000 tons per shift.

The design of face equipment used in conventional mining has jelled into such a few conservative types that there is very little difference in the performance of the shuttle car or in the manner in which they are loaded. A brief discussion of these two matters will be given later. The factor which bears most upon the performance of a shuttle car system is the method by which the coal is taken away from the shuttle car, that is, the design of the haulage system.

Main Line Haulage

Prime interest in any equipment is (1) What type shall be bought if purchase is needed, and (2) How shall it be more efficiently used if already in use. If a mine is being opened and shuttle cars are to be used, even though the future use of continuous mining may be contemplated, the factor which needs most consideration, other than the method of loading, is the method to be used for hauling the coal away from the shuttle cars.

There are essentially three choices of main line haulage. (1) All rail haulage on main entries and panels; (2) All belt haulage on main entries and panels and (3) Main line rail haulage on main entries and belt haulage in panels. In all cases considered hereafter it is assumed that shuttle cars are used to deliver coal from the face to one of the three types of haulage outlined above.

Several coal mines in Western Kentucky are used as illustrations because (1) Mechanization began very early in Western Kentucky (shuttle cars being in use in 1938); (2) The three commercially producing seams are similar to those in Illinois and Indiana, and as such are representative of a major part of the coal producing capacity of the nation; (3) The seams vary in thickness from 36 to 84 in. and all con-

ditions of bottom, top, cover, gas and water are encountered (except coal bumps); (4) Practically every known type of face preparation and loading equipment has been in use in the field; (5) Mining methods are similar to those in other states; (6) Both belts and rail haulage have been used here as early as they have been used in any field; and (7) Costs of production in the field are low.

Rail Haulage and Shuttle Cars

For a discussion of all rail haulage (in main entries and panels) let us consider a mine that comes as near as any the author has seen to making a success of this type of haulage when using shuttle cars.



Car change-time has a direct bearing on unit efficiency. The problem is to get a surge capacity between the shuttle car and the mine car

The mine is operating in the No. 9 seam which is 54 in. thick. Bottom and top conditions are fair to good in 80 percent of the mine. Posts on four-ft centers and safety jacks constitute most of the roof support which is often unsupported across 12-ft spans. Seventy-five percent of the coal is extracted.

The mine opened in 1940 using Joy 32 E shuttle cars (battery powered) and Joy 14 BU loaders. Airdox shootings, rubber tired drill trucks and Joy 10 RU cutting machines were added later. There are six units, four of which operate as double units—that is, they dump into the same mine cars by using elevating conveyors—and two units are single units, working on development. Sixty-six unit men load 2400 tons of clean coal per shift, averaging about 36 tons per man. At times, when extra timbermen are needed, less is loaded per man. The units average 400 tons loaded per shift.

Four main entries are driven with a dirt room on each side. There are

eight to ten working places if break-throughs are counted. Five panel entries are driven with rooms opened at right angles and necked in 75 ft. There are always three room necks being worked on each side. Thirteen to 15 working places are available. Panels are opened on 920-ft centers.

Rooms are driven in groups of 12, using the two middle rooms as key rooms from which break-throughs are lined up and turned at 45° through the other rooms. They are driven 400 ft. There are always 15 or 16 working places.

A development loading point is established along the main entries every 307 ft. At this point an elevating conveyor is set up. The tail track extends beyond the conveyor a short distance

and then turns at a 45° angle across the entries into the dirt room. When in production, after a move-up, the shuttle cars must travel around the tail track a distance of 250 ft to reach the face of the dirt room. When development is fully extended and another move-up is ready, the maximum shuttle car haul is 560 ft long. Loading time averages 96 seconds per car, shuttle car change is 20 seconds and dumping time is 60 seconds. An average of 79 seconds is lost at the face for each shuttle car (unless the time is utilized in maneuvering the loading machine) due to the necessity of developing the tail track extension.

Main line track must be put in as the unit advances. Two methods have been tried. One is to temporarily put light rail in two entries for development, following that up with heavy rail on well graded road bed about 1000 ft from the face when time permits. The other method is to keep the heavy main line rail close to the face at all times. The merits of either are discussed only for their influence upon

the shuttle car haulage. In both cases the shuttle cars must travel away from and around the track work, losing precious time.

It costs approximately \$1200 to remove track and relay it. To extend the loading point 250 to 307 ft costs about 3.4 cents per ton loaded over the loading point.

The haulage system is designed to furnish an excess of 25 percent haulage capacity so that while a unit is enjoying good working conditions the excess coal can be hauled, or if there is a short motor delay it can be made up. One hundred forty-three drop bottom cars are used, each having a four-ton capacity. These are divided into 11-car trips. There are 11 cars at each of the four loading points at all times.

When the haulage was three miles

trip toward the face so that the last empty car was under the conveyor. The motor stopped, uncoupled from his empty trip, moved up, and coupled to the loaded trip. He moved the trip out until the motor was opposite the front end of the empty trip, then stopped for a moment to give the loading point man time to uncouple the rope. The loading point man coupled the rope to the new trip of empties and pulled them so that the first car was under the conveyor. This cycle consumed three minutes during which time the shuttle cars lost two minutes when a rail car was not under the conveyor. In 20 trips to a loading point 40 minutes were lost when at least one car could not dump, although much of this lost time was absorbed before it became lost time at the face.



A small belt can limit the effectiveness of shuttle car haulage if several cars use the same belt

long, two main line motors pulled a 33-car trip between the gathering point and the bottom, a distance of two miles. They passed one another midway in time and alternated in delivering empties to the gathering motors, one trip every 18 minutes. Three gathering motors split the train into 11-car trips. One motor alternated between the two single loading points, and the other two motors visited each of the double loading points. Thus each unit was supplied with 11 cars every 36 minutes. Five motormen, with the help of a bottom man and a gathering point man for switching, pulled 2400 tons per shift a distance of three miles. No dispatcher was used as all movement was scheduled and empties as well as loads were hauled to the bottom. That is, all 11 cars were hauled to the shaft bottom each time the gathering motor made a trip whether the unit had completed loading them or not.

When the loading point man heard the motor coming, he pulled the loaded

One great disadvantage of all rail haulage is that the motors are deployed from a specified starting position when the shift begins and must be gathered at a finishing position when the shift ends. At the above mentioned mine, although it was theoretically possible to haul 23 trips of coal to the bottom, seldom more than 20 trips and never more than 21 trips were actually hauled. The loss of one or two trips per shift was serious, although part of the lost time was absorbed by the units making coal or getting ready to make coal.

An important advantage of all rail haulage is in the handling of supplies. At this mine one man on the day shift, with the part time help of another, filled the supply cars. Two men on the idle shift took the supply cars to the units and parked them in a switch provided for that purpose. The shuttle cars handled the supplies from there to the face.

There is always some time lost in discharging from shuttle cars into rail

cars because the shuttle must stop dumping while cars are changed. Several devices were used to prevent this loss of time; among them were: elevating conveyors, which offer some surge capacity; rail cars of the same capacity of the shuttle cars; a chute added to one end of the rail car which overlaps a chute on the end of the next rail car (the two chutes divert the coal to one car or the other with no spillage), and reversible conveyors hung over the rail cars or reversing bristles chutes.

Considerable trouble is experienced at this mine because of the desire to obtain as much large size coal as possible. Various methods were tried for breaking the lumps, either by having the loading machine helper break them or requiring the shuttle car man to break them at the elevating conveyor. It is certainly wrong to require the shuttle car man to do it, as it delays his return to the loading machine. At other mines mechanical devices have been mounted on the loading machines for breaking the lumps. These have met with some success.

Belt Haulage and Shuttle Cars

Another mine working in the No. 9 seam will be used as an illustration of all-belt haulage from shuttle cars. Mining conditions are approximately the same except that the seam here is 60 in. thick. Bottom and top conditions are good over approximately 80 percent of the area and 60 per cent of the coal is extracted.

The mine was opened in 1951 using Joy 42 E Shuttle Cars (cable), 14 BU loaders, 10 RU cutting machines, CD 16 drills and powder for shooting. Since then the loading machines have been replaced with new 14 BU8's and one Goodman 666.

Four units load 2700 tpd on the first shift, and one of the four loads on the second shift to fill the outside bin. Thus 62 men average 43 tons of coal per man shift.

Four main entries are driven, and there are six working places when break-throughs are counted.

Five panel entries are driven and rooms are necked about 20 ft. Usually, there are nine to 11 working places available. Panels are placed on 750-ft intervals and two are placed almost opposite one another. They are staggered slightly so that the belts from both panels do not dump at the same spot on the main entry belt. This makes it convenient for one transfer station man to watch both panel belt headers.

Rooms are driven in groups of six. The two middle rooms are the key rooms from which break-throughs are turned at a slight angle to extend across the remaining rooms. Thus, two haulage routes are kept open. Rooms are driven to a depth of 300 ft. There are always eight to nine working places.

The maximum shuttle car haulage distance in development is rarely over 400 ft. The belt move-up can be made in a single shift after the rubber and frame work have been removed. The cost of taking up, moving and reassembling a 250-ft belt is \$225.

One shuttle car always dumps over the tail piece of the belt when developing entries, while the other dumps over the side of the belt in the next outby break-through. This is done so there will always be two haulways. If one car breaks down it does not obstruct the second. In order to enjoy the advantage of the double haulway, 130 ft are added to the length of haul when entries are loaded out on the side of the panel on the opposite side of the belt from this travelway. The resulting delay is about 20 seconds for the one car.

Loading time and shuttle car change average 110 seconds. Dumping time is

on a long grade and the tail piece sits at the deep, inby end of the trench. A move-up is made every 150 ft. Rooms are worked on retreat and the tail piece is put back into every other hole on the way out. The trench is dug sufficiently long so that both cars can dump over the side.

When panels are driven off both sides of the main entries, the supply track is usually depressed below the panel belts on one side. This is done to clear the man trip cars and supply trips under the belts, but it slows down the speed with which supplies or man trips are handled on the supply track.

The use of 30-in. belts at this mine is a distinct disadvantage. Coal must be broken to a size that will stay on the belts. This necessitates stopping the loading machine while the lumps are being broken. Then, if two units dump onto a 30-in. belt and all four cars arrive at the belt together, the

haulage and panel belts with conventional mining. The combination has most of the advantages and few of the disadvantages of each.

Car loading is handled in several ways. At one mine the belts discharge into rail cars. There are two tracks available so that when the empties are pulled in on the track opposite the loads, the coal can be diverted to the empties by means of a reversing conveyor without stopping the belt.

At another mine a "britches" chute is used at the belt head to throw the coal from one car to another when changing cars. At a third mine a reversing conveyor is used for the same purpose.

At still another mine the drop bottom cars are equipped with extended ends which lap under one another and serve the same purpose.

A combination of belt and rail haulage has an advantage over all belt haulage in that no matter how irregular the coal property may be, the main entries can be turned in any direction. It also saves the huge outlay of rubber for main line haulage. On the other hand, it has the advantage of using belts in the panels. On any coal property that is irregular in shape, long and narrow and of not too severe a grade, this is an ideal system. In a rectangular property or one with severe grades, all belt haulage is attractive.

Influence of Other Factors

The design of conventional mining machinery has been refined to the point where there is very little difference in the machines or their ability to load coal. The essential difference between the two loading machines most used lies in the fact that one has a fixed head and the whole machine must be maneuvered to sweep the face, whereas the other has a movable head and the face can be swept with a minimum of movement of the entire machine. The second machine can operate under closer timbering conditions and the shuttle car can be loaded better and will haul a larger pay load. The first machine will clean the ribs better.

The extent to which the coal is broken by blasting affects somewhat the ability of the loading machine to put a larger pay load on the car. When the lumps are smaller in size the loading machine conveyor can be held higher against the roof and thereby stack the coal further back into the car.

Battery cars were the first to be developed and have one big advantage over cable cars but many disadvantages. They are extremely mobile in good bottom conditions and can range at long distances from the dumping point. For this reason they are still used to transport supplies, for the recovery of roof bolts and timbers and

(Continued on page 124)



Flexibility of movement is the great advantage of the shuttle car

45 seconds which leaves 75 seconds for travel. The car can travel up to a distance of 225 ft before delaying the loading machine. The outer limit of travel is usually fixed at the point where cable can comfortably reach, which is between 350 and 450 ft. The delay while waiting for a shuttle car is often used up by the loading machine in maneuvering at the face.

In one nearby mine both cars dump over the tail piece of the belt. One car leaves the belt entry for one of the other entries at the next inby break-through. The cars are thus reduced to using a single travelway for only 20 or 30 ft of their travel. There is no excess travel except when loading out the belt entry.

Cars with elevating heads on the conveyors are best for dumping in cars or on belts under most conditions of seam and roof. Where shuttle cars do not have an elevating head, top is sometimes taken down and ramps built. One mine depresses the belt because it is less costly than taking top and building ramps. A trench is dug

first two cars can dump at full speed, one dumping on the coal from the other; the third car must dump at slower speed and the fourth car must wait. Thus there is an 18-second delay on the third car and a 45-second delay on the fourth car. This is not too serious when only four cars are used, but if a third car is added to each unit serious congestion results. The 30-in. belt also interferes with the efficiency of any third unit which might operate on the same belt with two other units.

When working rooms, each car can dump through a separate break-through, independently of the other car, which is a valuable advantage over rail haulage.

The actual time during the shift when cars can dump is longer than when using rail haulage. The belts are running from the start of the shift until the finish of the shift.

Shuttle Cars and Combination Haulage

There are several mines in the area using a combination of rail main-line

"We get just the strength we need in 'Monobel'® AA— it breaks up our 'boney,' gives large lump"

reports L. F. Workman, General Manager, Lorado Coal Mining Company, Lorado, W. Va.

"No matter what method we tried, the 22-inch 'boney' in our No. 7 Mine used to give us trouble. Either they broke it in large lumps, which slowed us down, or powdered it —and you know what high ash means! Then we tried

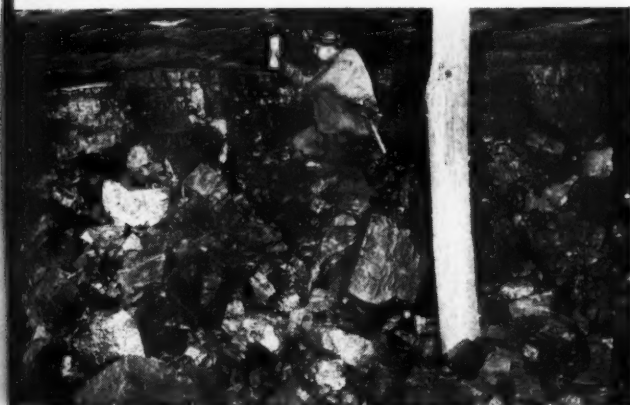
Du Pont's 'Monobel' AA, and switched to it 100%. It's just what we need. Throws the 'boney' clear of the coal in easy-to-handle sizes, produces large lump and shears ribs and face clean, right to the back of the cut."



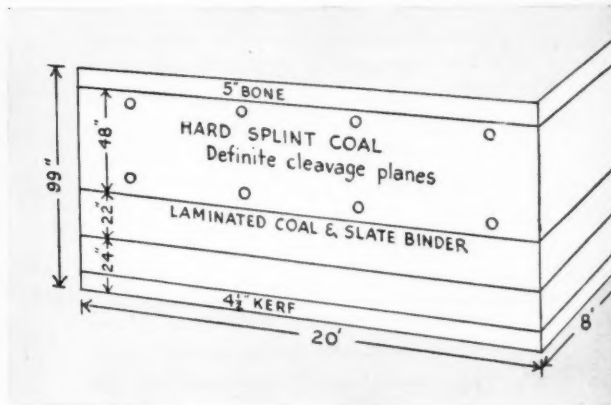
1. SOUNDING the roof. Shot has pulled all the way to the back of cut, squaring up the face. And note the straight-sheared ribs consistently obtained with "Monobel" AA.



2. LOADING charges after undercutting—operator tamps hole just above 22" laminated coal and slate binder. Now watch how this thorny shooting problem is cut down to size!



3. HEAVING action of Du Pont "Monobel" AA breaks the "boney" well and throws it clear, while giving a high percentage of coarse, quick-loading, easily cleaned coal.



4. WORKING hand in hand with the Lorado people, Du Pont technical service men helped devise the efficient shooting pattern shown above. All rooms in this mine are undercut.

Binder problem? Looking for firm lump? Du Pont "Monobel" AA can help you on both counts. It breaks coal and slate down to loadable size, with a minimum of "fines"—leaves a clean, straight face. Convince yourself by testing "Monobel" AA soon. For complete information, contact the Du Pont man in your district or write: E. I. du Pont de Nemours & Co. (Inc.), Explosives Dept., Wilmington 98, Del.

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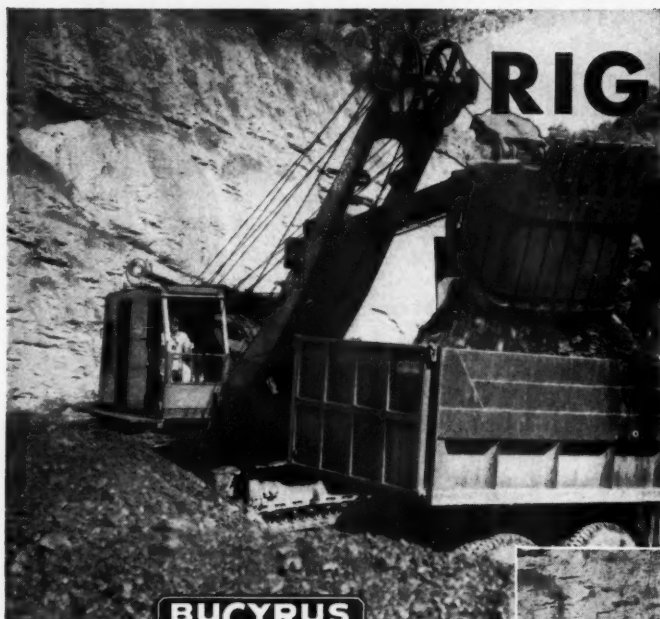
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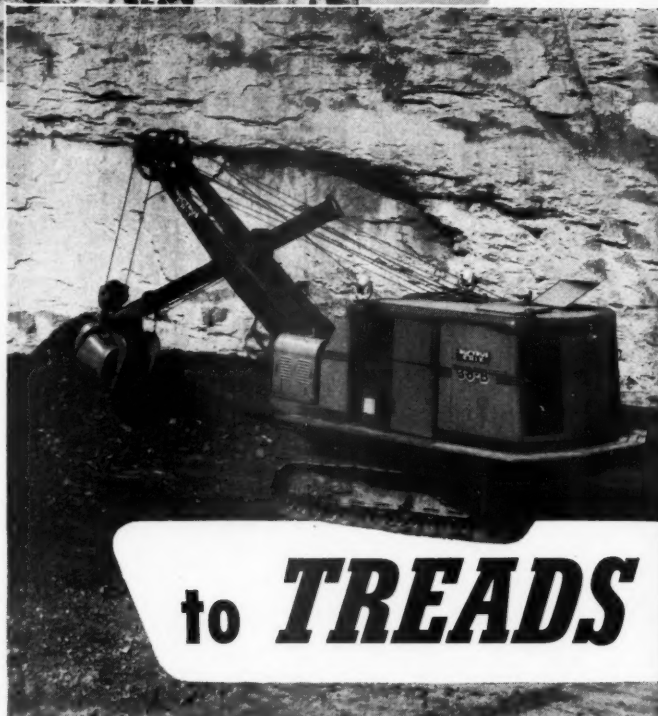
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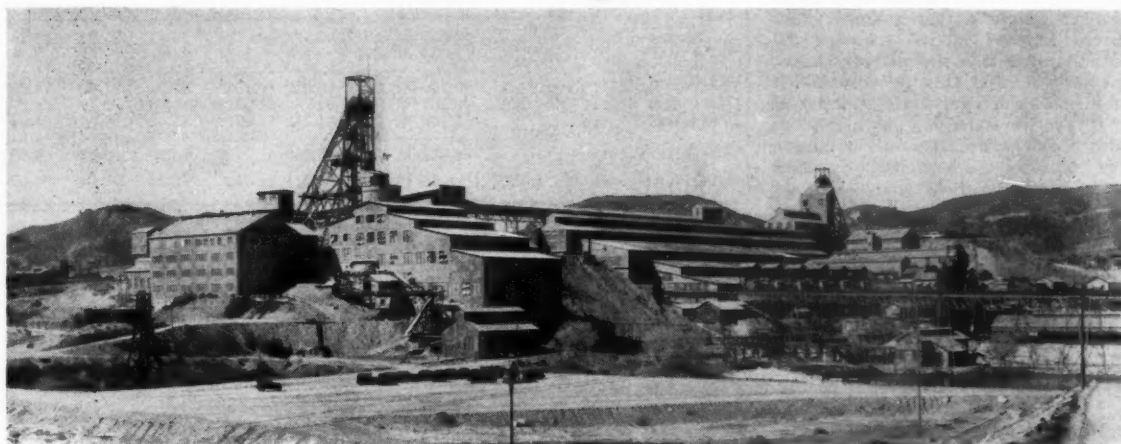
at the Coal Show

BUCYRUS-ERIE COMPANY

South Milwaukee, Wisconsin

[Page 88]

Block Caving at Miami



Mining of low grade ore at Miami started in 1925

Experience of 29 Years Shows Careful Planning and Strict Attention to Detail Pays Off in Better Recovery, Lower Maintenance Costs

By J. W. STILL

General Superintendent
Miami Copper Co.

ASSUMING that those in the industry who are interested in block caving are familiar with the general mining scheme at Miami, no attempt has been made to cover the operation in detail. In the 43 years of mining, the last 29 years of which have been block caving, a great many experience factors have been developed, some being extremely important as controls, both in the advance planning and the day to day operation. The following observations and supporting data illustrate these major control factors.

Mining of the Miami low grade started in 1925, and to mid-1954 some 97,000,000 tons had been mined from completed stopes. At the start the ore reserve figure was 84,000,000 tons and as the mining system proved itself, sizeable additions were made to the original estimate.

The original mining scheme on this low grade was thoroughly covered by F. W. MacLennan in the AIME publication #314-A-34—"Miami Copper Company Methods of Mining Low Grade Orebody" issued with "Mining and Metallurgy," March 1930.

Briefly this scheme proposed the mining of about 550-600 vertical feet of ore in two lifts (720 and 1000 level haulages) in individual stope units and on a full gravity basis. There have been few changes in the basic scheme and only the following were of a major nature.

(1) Pillars were enlarged from 15 ft on the 720 lift to pillars either 30 or 50 ft on the 1000 lift. This change offered effective protection against dilution from adjoining mined-out areas.

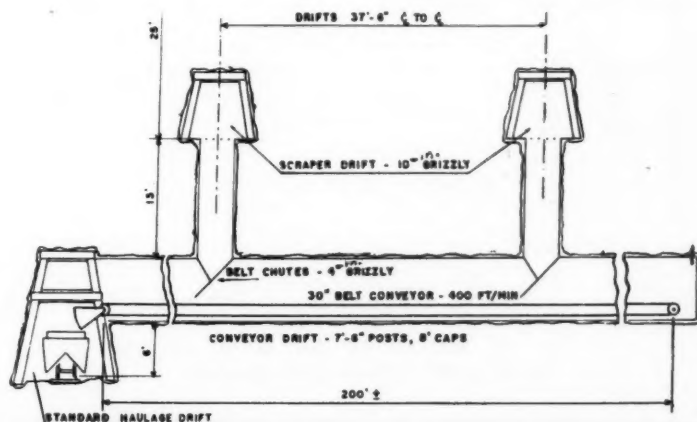
Mining experience has shown that an unknown, but substantial, pillar tonnage is recovered thru side movement of pillar ore into the adjoining producing stopes.

(2) Square set control-draw points at the top of the grizzly raises were abandoned, the spacing of the draw points changed from 12.5 ft center to center to 16.66 by 18.75 ft and drawing is done from the bottom of the grizzly raise (now called the control raise). This simplified drawing

and maintenance with no adverse change in copper extraction.

(3) During the war years, due to the shortage of men, boundary slice level work was also discontinued, with little or no change in the copper extraction picture apparent.

(4) The last 18,000,000 tons of the low grade orebody bottomed directly over the 1000, or lowest, haulage level, the grizzly level being on the 975. This made it impossible to use the full gravity set-up, and made an additional lateral transfer necessary. After mining several test stopes on the 850 and 900 grizzly levels with both shakers and scrapers from 1943 on, we finally settled on 25 hp double drum hoists and 42 in. scrapers for this necessary lateral transfer and from



Haulage drifts were moved out of heavy ground and ore moved from grizzly to car on conveyor belt

about 1947 the bulk of the tonnage has been mined mechanically.

(5) Mining directly over the haulage, in the weaker areas threw prohibitive weight on the haulage. This forced another lateral transfer out to a haulage line not directly under the stope. For this purpose 200-ft 30-in. belt conveyor units running at 400 fpm were decided on and since 1949 about half of the slusher mining has been over the belts, with five such units currently in service.

Results to Date

As shown in the accompanying diagram there was a mining loss of about 19 percent of the copper content. Of this loss, the larger part, or about 81 percent, was left in pillars. This represents a sizeable tonnage of copper, totaling 163,800 tons of copper metal. Leaching of the caved area will undoubtedly recover an appreciable portion of this; for since leaching was started in 1942 (on only a limited portion of the area eventually available) some 28,340 tons of copper have been recovered.

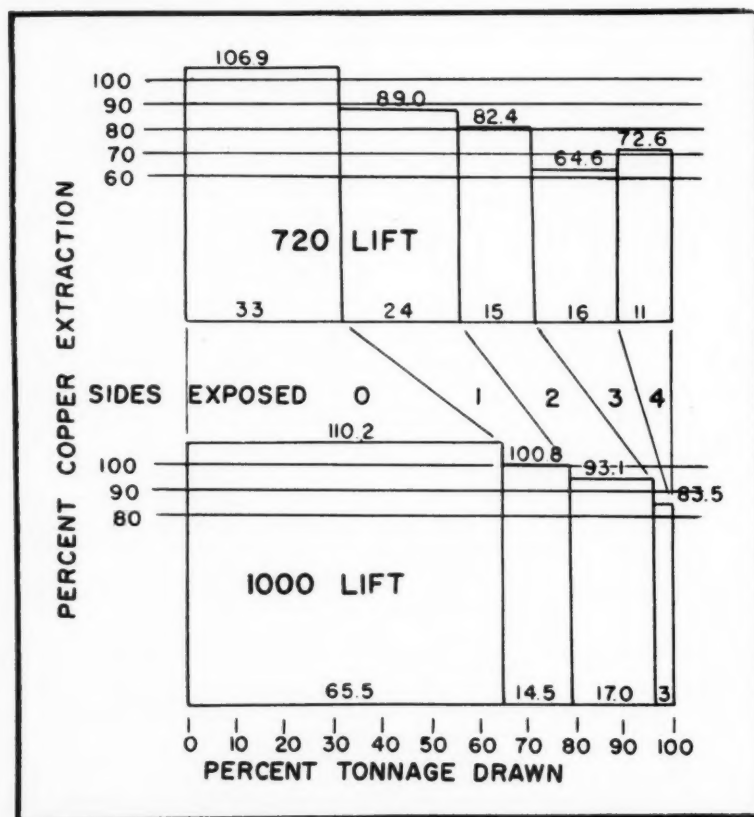
Supervision Most Important

By far the most important control factor is the day by day supervision by engineers and bosses. The Miami

(Tons in 1000's)						
		Expectancy	Drawn	Extraction Percentage		
				Tons	Grade	Copper
720 Stopes (69)	40,577 @ .878	40,522 @ .763	99.87	86.90	86.79	
720 Pillars	7,130 @ .859					
720 Lift Total	47,707 @ .875	40,522 @ .763	84.93	87.20	74.06	
1000 Level Stopes (65)	49,204 @ .741	54,937 @ .692	111.65	93.39	104.27	
1000 Level Pillars	11,164 @ .747	1,752 @ .716	15.69	95.85	15.04	
1000 Lift Total	60,368 @ .742	56,689 @ .693	93.90	93.93	87.69	
Total Both	108,075 @ .801	97,211 @ .722	89.94	90.14	81.07	

720 Lift Stopes	Sides Exposed	% of Total Tonnage Drawn	% Ton Extr.	% Grade Extr.	% Cu. Extr.
16	0	33.3%	115.48	92.56	106.89
17	1	24.4%	101.52	87.72	89.05
13	2	15.2%	97.47	84.55	82.41
15	3	16.3%	82.28	78.54	64.62
8	4	10.8%	90.84	79.54	72.65
69	43% Av.	100.0%	99.83	86.79	86.64
Perimeter Exposure					

1000 Lift Stopes	Sides Exposed	% of Total Tonnage Drawn	% Ton Extr.	% Grade Extr.	% Cu. Extr.
37	0	65.5%	116.67	94.43	110.17
12	1	14.5%	105.02	96.00	100.82
14	2	17.0%	103.15	90.24	93.08
2	3	3.0%	96.02	86.98	83.52
65	13.4% Av.	100.0%	111.65	93.39	104.27
Perimeter Exposure					



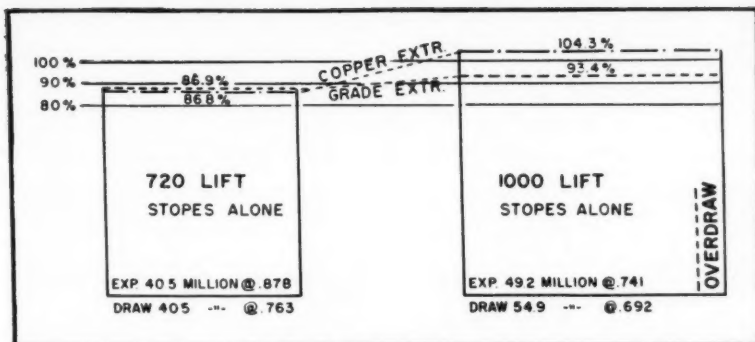
Advanced planning of pillar size and stope sequence minimizes dilution from previously mined stopes

operation uses a blanket of supervision, averaging 45 bosses plus 12 engineers. They supervise some 475 days-pay men; or a ratio of about 1 supervisor to 8 men. Among the 57 supervisors, primary responsibility is carried by 14 men. On the engineering side are the mine superintendent, his assistant, the chief engineer, two stope engineers, one development engineer and a supply engineer. On the bossing side are a general foreman, three shift foremen and their three assistants. The engineers and mine bosses' duties are patterned so that the coverage is overlapping and co-operative. From the engineering side come the orders on draw control, development and repair sequence, work specifications, supervision of bonus contract rates and payments.

The foremen and bosses follow through on these orders and directly supervise the men actually doing the work.

All other controls are more or less fixed in the details of the mining plan. Some are flexible so changes can be made as they become advisable. The comparison between the 720 and 1000 lifts shows the beneficial results of enlarging the pillar protection from 15 ft to 30-50 ft. The change became possible when the new lift was planned.

Second only to the day by day supervision is the advance planning on stope sequence, development schedules, and the routine drawing and stope maintenance problems.



Mining Results on 97,000,000-ton draw

Planning Stope Development

Assuming that a 110 percent draw can be expected and that the rate of draw will be about nine vertical inches of ore in place per 24 hr, an advance estimate can be made showing the dates when new stopes must be brought in.

This advance development schedule is carried in some detail at least 18 months to two years ahead, being revised and rechecked about every three months. While the long range part of these schedules is rarely followed exactly, this long range planning tends to level off the development crew necessary, shows up needed and advisable dump raises, ventilation and service tie-ins, permits avoidance of ore train congestion, avoids bottle-

necks of various types; and in general permits killing as many birds as possible with each shot.

On a 12,500-ton daily demand, all the extra safety factors allowable in undercut ore is perhaps an additional 1000 to 1500 available tons. To avoid packing and weight, undercut ore must be pulled and too much insurance, that is, too much ore undercut can be pretty expensive. This requires a certain amount of calculated risk but a running study of the current performance of operating stopes will generally indicate the advisability of speeding up or slowing down the next stope scheduled for production.

It is always advisable to stay well ahead on the slow part of stope preparation. Driving haulage lines, transfer raises and stope fringes, due to

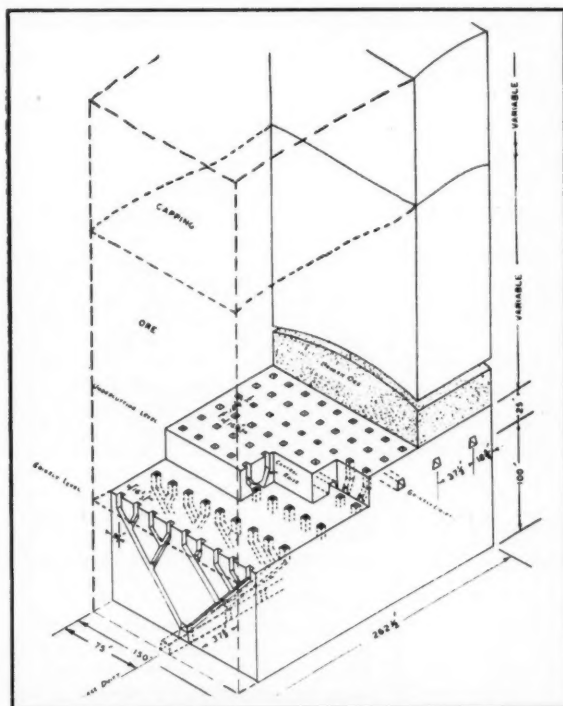
the necessary sequence and limited number of working places is somewhat slow. However, once they are in, the remaining work can be held up if need be with little or no weight or maintenance risk. When needed the grizzly drifts, control raises and undercut can be driven rapidly as numerous working places are available and the speed required can be regulated by the number of men assigned to the work.

All stope preparation work should be done to close and standard specifications. This encourages good working habits and results in the job being done right the first time. All important is the undercut. This must be 100 percent clean, with no pillars left.

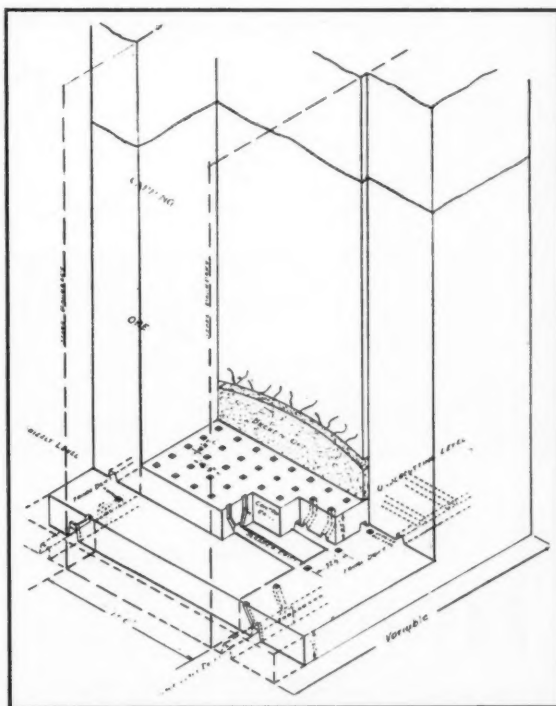
Stope Draw Maintenance

Advance estimate of burden is taken at nine vertical inches per 24 hr; or on a 150 by 200-ft stope 1800 tons can be expected. Considerable latitude is permissible on this nine-in. factor. In a heavy stope that caves readily, up to 18 in. may be advisable to stay ahead of the weight, provided always that the drawing is uniformly done. Conversely, stopes with no weight problem can be slowed down under the nine-in. factor for a limited time.

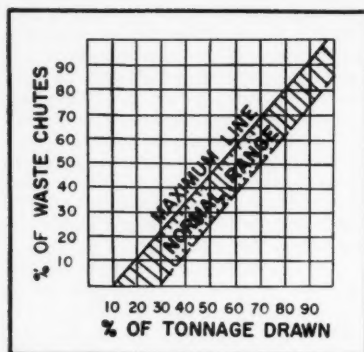
The way the first 10 to 15 percent of the tonnage is drawn will either make or break the stope. Promptly and without fail immediately after the undercut, each draw raise should



Original mining scheme called for full gravity operation from undercut to haulage level cars



Since 1947 ore has been moved laterally on grizzly level with scrapers, eliminating transfer raises



Normal range of draw points showing waste as stope is drawn. When maximum is exceeded stope should be cleaned up

be cleared of undercut timber, pulled for about 400 tons and be set to go. As the undercut progresses, those draw points undercut should be uniformly drawn enough to keep them loose; but full stope production should not be taken or expected until the stope is completely undercut.

After the undercut is finished every effort should be made to get and keep a uniform draw. Special emphasis is placed on this until at least 15 percent of the stope's tonnage expectancy has been drawn. By the time the 15 percent point has been passed a uniform blanket of broken ore overlays the extraction area. This acts as a safety cushion and will absorb with a less uniform draw, those weight points which otherwise might come on thru to the grizzly level. This early draw, during and right after the undercut, is the critical stage. If sloppily handled, it will almost certainly insure later weight and a consequent excessive maintenance cost.

Inherent in block caving mining is the weight and stope repair problem. This can only be fought with intelli-

Grade up to
100% Stope Expectancy

Overdraw

Grade	% Total Tonnage	Grade Total Tonnage
10 Year Averages		
.689/.083	.677/.106	13.2%
Net Sulphide .606	.571	.687/.086
		.601

gent day by day draw control and repair sequence planning. The following points out the effect on costs and copper recovery of heavy areas on the 1000 level lift.

If prescribed procedure is followed exactly, the stope has a good chance to be a good performer, both cost and extraction wise. However, the many factors inherent in block caving produce a certain number of tough stopes. Hung transfer raises, where the train crew blasts out cribbing and the draw raises pack while the necessary raise repairs are being made; sizeable gouge fault areas that strike across the stope slow up the draw and make it erratic; haulage level weight that may slow the whole stope down; block movement that may perhaps pivot on a structural weakness and over a week-end throw weight on several stopes at the same time; all of these at times make uniform drawing impossible, push the stope over on the tough side and make it necessary to get out as best you can.

Work Out Repair Sequence

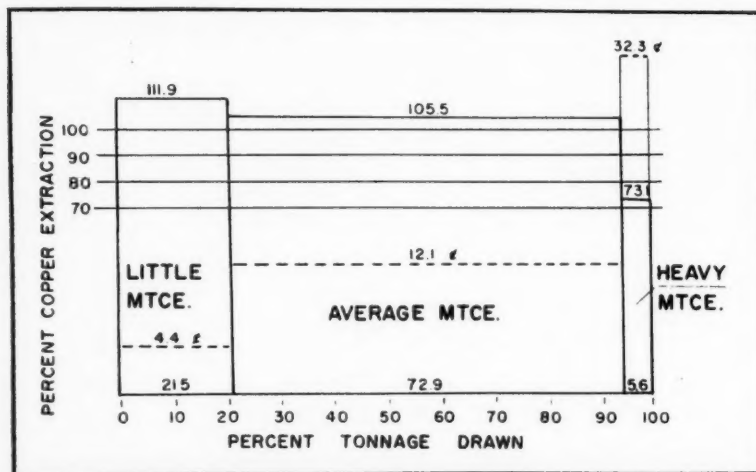
In such cases, some specific method of attack on repair sequence must be

worked out and followed through. Always, and so far as possible, doing this repair work in a way that drawing can promptly follow the repairs. At times it is advisable to abandon temporarily certain sections of the stope, let it pack for a time and bend every effort in another section to get set to again establish a draw. The variations of this problem are endless and some are extremely discouraging, but a concerted, intelligent tackling of each problem by the engineer and foreman talent available will practically always find an answer.

It is important that waste-dilution be intelligently handled and kept to a minimum. From the time a stope is about 30 percent drawn, waste will appear in an increasing number of drawpoints. Sealing and packing these for a limited time (5 to 10 days) and then reopening will tend to clean up most such drawpoints, the percentage of cleaning up naturally becomes less as the stope moves closer to 100 percent tonnage extraction.

Dilution from the capping is an integral part of the mining and is compensated for by an overdraw. Experience on the 1000 lift is an overdraw

Stope Mtce. Tons/MS	Stope Mtce. Cost/ton	No. of Stopes	% of Total Tons Drawn	% Ton Extr.	% Grade Extr.	% Cu. Extr.
300 Plus—Little Mtce.	\$0.044	12	21.5%	120.06	93.23	111.93
300-100—Av. Mtce.	\$0.121	44	72.9%	111.94	94.27	105.52
Under 100—Heavy Mtce.	\$0.323	9	5.6%	85.33	85.62	73.06
Totals & Av.	\$0.115	65	100.0%	111.65	93.39	104.27



1000 level lift—Effect of Heavy Areas on Maintenance

of about 11 percent of the expectancy. The following table shows the overdraw picture for the past 10 years and indicates that this overdraw is not greatly different than the "underdraw".

On day to day stope operation it is absolutely necessary that the draw and repairs be planned so they will be of maximum benefit, not alone for the immediate future, but for the remainder of the stope's life. Such planning permits the stope to carry its full tonnage load right up to the last month or six weeks, and generally gives a tail-end period of low repair costs.

In conclusion, it must be borne in mind that these various patterns have been set over long periods and by large tonnages. Over short periods and in single stopes these patterns are sometimes contradicted.

COST-CUTTING MEMOS:



USE THE RIGHT EXPLOSIVES: Don't buy certain grades or types of explosives from force of habit! Possibly you can replace gelatins and semi-gelatins with equivalent-strength, and more economical, ammonium nitrate dynamites. Coal mines operating on short schedules should check economy of improved permissibles. Stripping and open pit operations may find greatest savings in cored ammonium nitrate explosives.



USE THE RIGHT TYPE CARTRIDGE: Fluted ends on cartridges (as with Apex® above) make for easier loading of both horizontal and vertical holes with no significant loss of compaction. Spiral winding protects against cartridge rupture. Loading crews are not held up by stuck cartridges. In underground operations, Redi-Slit® cartridges mean quicker and easier loading. The right type cartridge will cut costs.



SELECT THE PROPER POINT OF INITIATION: There is much misinformation and superstition on this subject. However, many open pit operations are effecting important savings by initiating blasts at the point of maximum confinement—normally the bottom of each hole. Not only is explosives efficiency increased, but excessive air blast is avoided . . . as well as complaints and damage claims.



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First Diesel equipment used underground was a small bulldozer

Diesel Equipment in Underground Mining

Rapid Adoption in Carlsbad Mines Follows Success of First Unit

By H. A. LONDON

Supt. of Maint. & Const.
Duval Sulphur & Potash Co.

DIESEL equipment for haulage and miscellaneous use in open pit mining has long been an established practice. Observing its advantages, underground operators started experimenting with similar equipment to determine its adaptability to their operations.

Running internal combustion engines in limited ventilation such as encountered in underground mining presented problems of operation and maintenance not hitherto existing. Diesel powered equipment was chosen for underground usages for two principal reasons; namely, the engines can be tuned to such a degree that toxic gases can be held within safe limits and secondly, the fire hazard from the fuel storage is not so great.

The U. S. Bureau of Mines experimented extensively with Diesel equipment in the experimental mines at Rifle, Colorado. Out of the tests made there certain procedures were developed to determine under what conditions a piece of equipment could be considered permissible. A basis of standards governing the percentage of toxic gases which could be safely tolerated was established. As the use of Diesel equipment increases, the Bureau is gaining additional information; and a more complete set of standards will no doubt be established. The standards as now considered permissible in working environments are as follows:

Carbon Monoxide (CO) not more than 0.01 percent, by volume.

Carbon Dioxide (CO₂) not more than 0.5 percent, by volume.

Oxides of Nitrogen (NO₂) not more than 0.0025 percent, by volume.

Oxygen (O₂) not less than 20 percent, by volume.

Aldehydes Objectionable

The percentage of CO acceptable at the exhaust of an engine has been established as 0.025 percent by volume. Since the presence of aldehydes and smoke are apparent when in objectionable quantities, no testing standards have been established for these.

A smoky exhaust is an indication of faulty operation of the engine. By operating experience it has been found that a smoky exhaust is usually accompanied by an excessive amount of carbon monoxide. Such equipment should be promptly removed from service and given the necessary attention.

The first Diesel equipment to be used underground in the Potash Industry was a Caterpillar D4 Tractor. These machines are used to clean faces behind loading equipment, stacking gob, building roads, and for miscellaneous other purposes. They are equipped with an engine of the following specifications:

- 4 Cycle
- 4 Cylinder
- 4½-in. Bore
- 5½-in. Stroke
- 350 Cu in. Displacement
- 43 Drawbar Horsepower at 1400 rpm
- Indirect Injection System

A "scrubber" is used to reduce the aldehydes and oxides of nitrogen existing in the exhaust. This scrubber is filled with a solution of water containing sodium sulphite and hydroquinone, and is completely flushed and recharged after every 16 hr of service. The initial charge is one lb of hydroquinone, 15 lbs of sodium sulphite and 15 gals of water. After eight hr of operation, a supplementary charge of one lb hydroquinone and additional water is added.

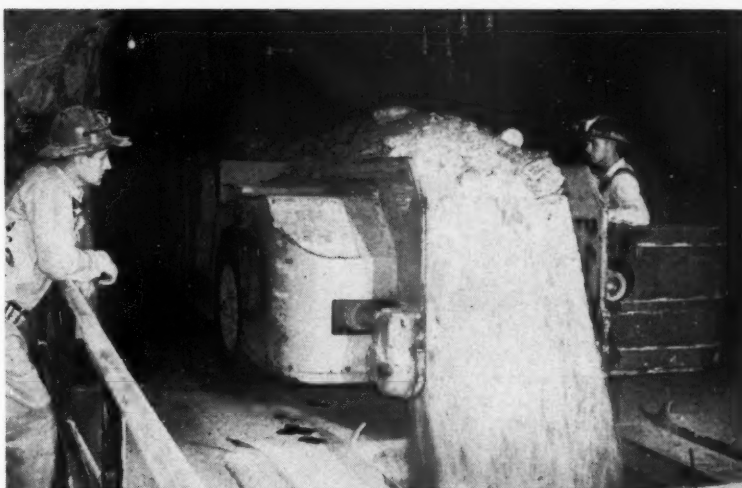
Preventive Maintenance

The engines are given a rigid preventive maintenance program. Most of the practices are the results of experience. The manufacturer's recommendations are followed as nearly as possible. Since these recommendations are made for surface operation, certain modifications are necessary. Some of the notable modifications are as follows:

Exhaust and inlet valves are set at 0.009 in.

Fuel injection pumps push rod depth changed from 1.736-in. to 1.725-in. (to reduce amount of fuel injected and raise fuel-air ratio).

Raise idling speed from 500 to 650 rpm.



Diesel-electric shuttle car is "permissible" in mines other than coal

Raise Full Load speed from 1400 to 1600 rpm.

Change Oil & Filter Element each 100 hr.

Clean and service Air Filter Daily.

The engines are tested for carbon monoxide content on a regular schedule by the Safety Engineer. A Colormetric Tester is used for this purpose.

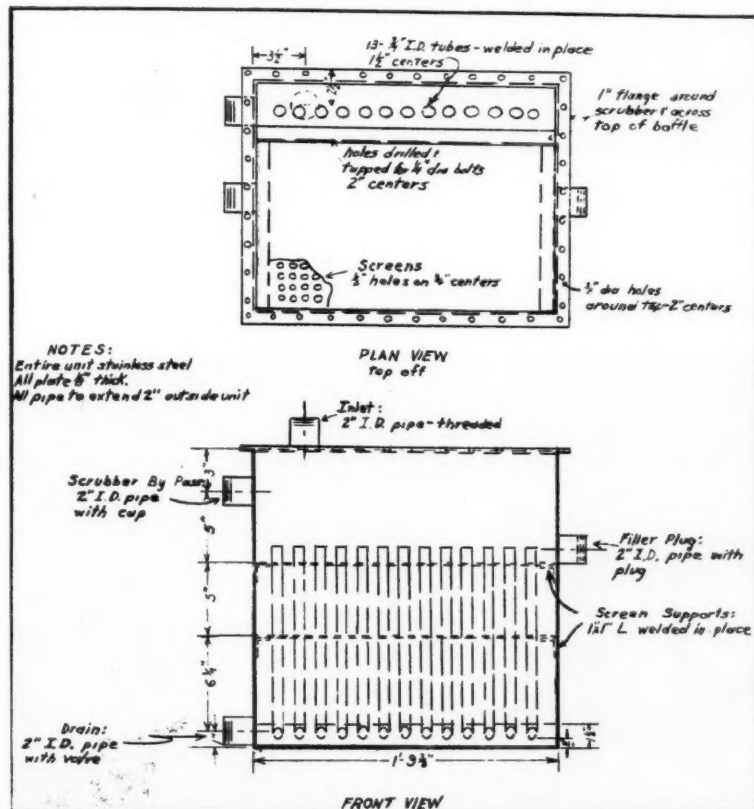
Use Shuttle Car

In 1951 the Joy Manufacturing Co. designed and built a Diesel Electric Shuttle Car for use in underground mining. This car carries a Bureau of Mines approval plate endorsing its use in mines other than coal. On the approval plate, the minimum amount of ventilating air is specified as 14,900 cu ft per min.

The car has a cubic capacity of 270 cu ft at water level, is powered with a three-cylinder, two-cycle, series 71 General Motors Engine rated at 82 hp at 2000 rpm using 60 millimeter injectors, and the engine is directly connected to a variable-speed direct current generator rated at 50 kw, 250 volts at 2000 rpm. A hydraulic pump used for power steering is also directly connected to the engine. The generator drives two 15 hp traction motors, one connected to each of the two rear wheels, and a 15 hp conveyor motor. Engine specifications are:

- 3 Cylinder
- 2 Cycle
- 4½-in. Bore
- 5-in. Stroke
- 212.8-cu in. total displacement
- 82 hp at 2000 rpm.
- Direct Injection System

The car is controlled by the speed of the engine. It is possible to electrically brake the car by plugging the traction motors, and the degree of braking desired can be maintained by the engine speed. Smooth acceleration is obtained by the cushioning action of the generator build-up. The speed can be maintained at any level from 0 to maximum, approximately 6 mph on level ground. An audible signal is used to indicate overspeed. The conveyor motor is controlled in the same manner as the traction and any conveying speed from 0 to 60 rpm can be maintained. This motor is



Calcite type scrubber reduces aldehydes and nitrogen oxides in jeep exhaust



Shuttle cars each carry 10.5-ton payload from face to belt head

electrically interlocked with the traction so that it is impossible for the two motions to be simultaneous.

The first of these cars to be used in the Southwest was delivered to Duval Sulphur & Potash Co. and was placed in service in December 1952. The car is used to transport potash ore from the mining face to the belt head, and a payload of approximately 10.5 tons per trip is carried. The versatility of this car prompted the purchase of a second unit which was delivered and placed in service during 1953.

Use Smaller Injectors

As in the case of the Caterpillar Tractor, certain operating problems were encountered and again resolved through experience.

When the original car was delivered it was equipped with 70 millimeter injectors. The carbon monoxide output in the exhaust was excessive, indicating too high a fuel-air ratio. The injectors were changed to 60 millimeter, but this change did not produce the desired results. A new approach involved changing the timing to start fuel injection at 15° ahead of dead center instead of 12° as originally set. This is accomplished by using a 60 millimeter injector and setting it with a 70 millimeter timing pin. Such a timing is very critical, and it is necessary to bar the engine in place rather than bump by use of starter. This timing change gives a satisfactory result; however, other changes were made. The exhaust valve setting was changed from 0.010 in. to 0.008 in. in an effort to raise the operation temperature from 180° F. to 210° F. to obtain more complete combustion. An examination of the engine after approximately six months' operation at the higher temperatures did not reveal any excessive wear or other detrimental effects. It was also found necessary to lower the oil level in the air cleaner approximately ½ in. to prevent carry over. The air cleaners are serviced every eight hr. Primary fuel strainers are changed

every 50 operating hr, and the secondary every 100 hr. The crankcase oil and filters are changed each 100 hr.

The first complete overhaul on one of these engines was performed after approximately 5000 hr of operation.

This overhaul was necessitated by the failure of a rear main oil seal rather than excessive wear. Since it was necessary to completely dismantle the engine in order to replace the oil seal, new parts were installed such as bearings, rings, and seals, and the valves were ground and seats refaced. The entire engine and generator were cleaned.

Simplify Scrubbers

When these cars were received they were equipped with scrubbers using hydroquinone and sodium sulphite solutions. Since the servicing and chemicals represent an expensive maintenance item, the scrubbers were modified in such manner as to make use of a combination of copper wire and calcite in the water solution to eliminate the need for hydroquinone and sodium sulphite. With this com-

bination service time is reduced greatly and the chemical cost is nil.

Since a main-line belt haulage system had been adopted at this mine, transportation of supplies and men became a problem. During the first year of operation battery-powered electric jeeps were satisfactory. As the working areas were expanded these jeeps eventually proved inadequate due to their slow operating speed and the distances traversed.

To solve this problem a standard jeep was purchased and the gasoline engine replaced with a Waukesha Model 180 DAC engine. The engine specifications are:

4 Cylinder
4 Cycle
3-15/16-in. Bore
3¾-in. Stroke
129 cu in. Total Displacements
28 Horsepower estimated at 1600 rpm

Indirect Injection System

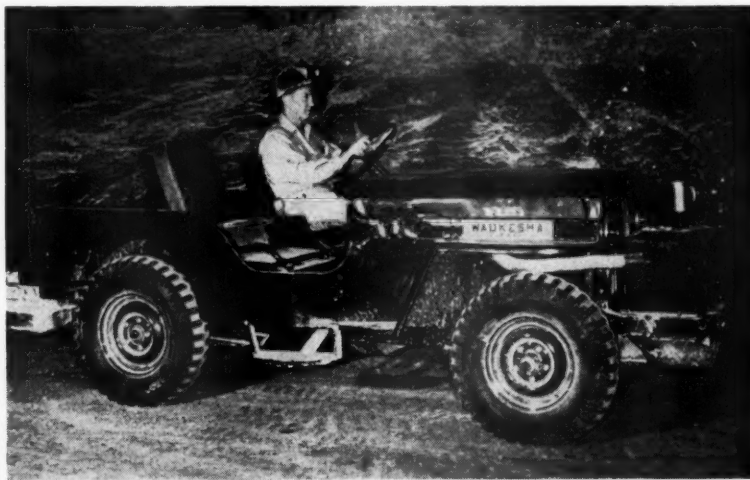
This unit proved to be highly satisfactory from both an operational and maintenance standpoint. Only minor modifications were required to obtain acceptable operating conditions. After the original unit was placed in service, two additional units were purchased and are now in operation.

Need Four-Wheel Drive

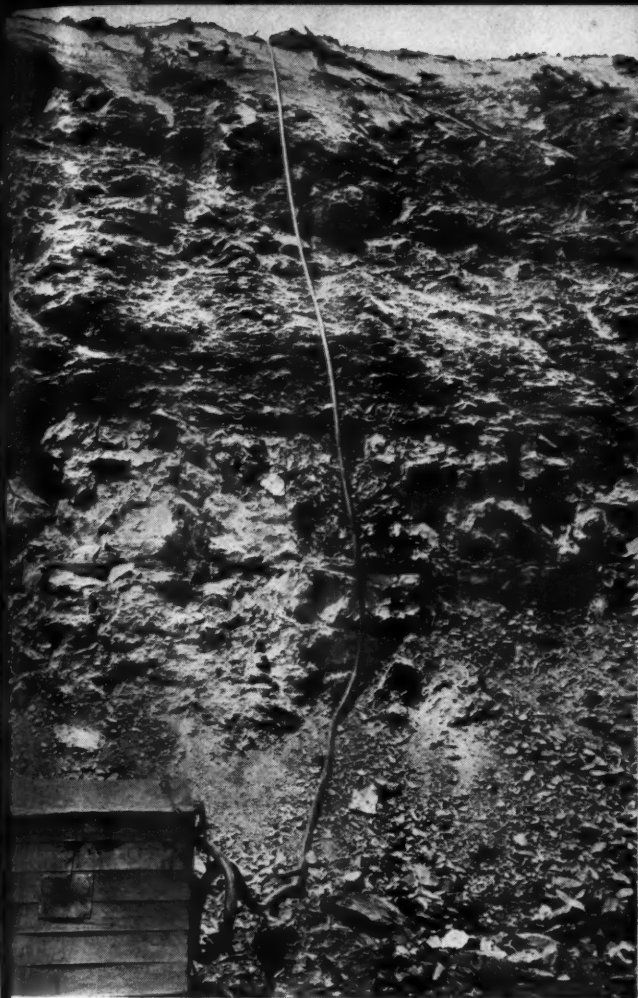
A Utility Truck which consists of an Army Weapons Carrier Chassis and a Waukesha 190 DLC engine was placed in service in 1953. This unit is rated at one ton capacity. The engine specifications are:

6 Cylinder
3¾-in. Cylinder Bore
4-in. Stroke
264 cu in. Total Displacement
50 hp at 1600 rpm
Indirect Injection System

(Continued on page 125)



Gasoline jeep was converted to Diesel power for transporting men and supplies



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Does uranium favor a particular kind of rock?

Lithologic Controls of Uranium Ore Deposits

Five Host-Rock Features Characterize Nine-Tenths of Uranium Mines of Colorado Plateau

By ROBERT J. WRIGHT

Chief, Geologic Branch, Exploration Division
U. S. Atomic Energy Commission

IT is proposed to discuss here the role of rock type in localizing uranium deposits in sandstones of the Colorado Plateau. Does uranium favor a particular type of rock? If so, what are the features of this rock and how closely are deposits controlled by it? Finally, what are the implications of origin of the ore?

Exposed rocks of the Colorado Plateau range in age from late Paleozoic to early Tertiary. Most are of continental origin—either eolian or fluvial. Only a few were deposited under marine conditions. More than a dozen formations are known to contain uranium in varying amounts, but by far the bulk of the uranium-radium ore produced since the beginning of the century has come from three formations—the Triassic Shinarump conglomerate, sandstones of the Triassic Chinle formation, and the Salt Wash sandstone member of the Morrison

formation, which is of the Jurassic age.

The Shinarump conglomerate, in view of its wide extent, is a thin formation. It ranges from a vanishing point to more than 100 ft thick. It consists of stream deposited gray and buff sandstone and conglomerate with discontinuous beds of mudstone and siltstone. Plant material is common, both as petrified wood and as carbonized plant remains. Most of its uranium ores are found near the bottom of ancient stream channels which were cut into the underlying Moenkopi formation. Within an orebody fossil plant matter serves as a localizer for high-grade ore. Under the microscope some specimens show replacement of fossil wood by pitchblende, with pitchblende preserving the cell structure of the wood.

The Chinle formation has recently come into importance as a uranium host rock with discovery of large de-

posits in Big Indian Wash, Utah. The Chinle is a variegated unit with mudstones of many colors, red siltstones, and red, tan, and gray sandstones. At the Mi Vida deposit, the Charles Steen discovery in Big Indian Wash, ore is contained within a gray, medium-grained, micaceous sandstone. Orebodies in the Chinle formation near Cameron, Ariz., are contained within lenses of tan sandstone in a section of varicolored mudstones. Much of the sandstone is barren, but it is red in color, in contrast to the tan color of the mineralized rock.

The Salt Wash member of the Morrison formation consists of discontinuous sandstone beds alternating with mudstones and siltstones. All of the units are of fluvial origin. Ore-bearing sandstone is tan or gray in color, in contrast to the red color of barren sandstone. The mudstones are red or gray, usually gray near an orebody. Replacement of fossil wood by uranium minerals is common. One mineralized log yielded \$200,000 worth of radium ore.

Significant Features

Space does not permit description of the host rock in the other mineralized formations of the Colorado Plateau. Instead, let us summarize the significant features which characterize the Shinarump, Chinle, Mor-

rison and the less important host rocks as well.

First, formations which yield ore were deposited by streams. Marine rocks and wind-deposited rocks are mineralized in only a few localities.

Second, the immediate host rock may be tan, buff, brown, beige, gray, lavender, pink; in fact, *almost any color except red*. This is particularly striking in view of the abundance of red rocks in the Plateau. The story is told that the late Dr. Herbert Gregory, one of the geological pioneers of the Southwest, was discussing some geologic features with a group of lads in Kanab, Utah, in the shadow of Vermillion Cliffs. Gregory's remarks on the color of rocks were interrupted by one of the listeners who said, "But mister, aren't all rocks red?"

A third feature of uranium beds in the Plateau is the fact that they usually contain carbonized fossil wood. As we have noted earlier woody material may be closely associated with high-grade ore.

Fourth, mineralized sandstones are normally micaceous or arkosic. The Salt Wash sandstone contains about seven percent feldspar. The micaceous host rock of the Mi Vida deposit in the Chinle formation has already been noted.

Fifth, sandstone units which interfinger or are interbedded with mudstone are favorable for ore.

Exceptions to the Rule

Having defined five characteristics of the kind of sandstone which uranium deposits seem to prefer, let us note some of the important exceptions to these rules. How completely do the rules apply? This is a difficult ques-



Replacement of fossil wood by uranium minerals is common

tion to answer accurately because of the lack of suitable data. This table represents the speaker's best estimates, and is, of course, a partial reflection of the deposits which he has seen and studied.

Very little ore has been produced from rocks other than fluvial. The eolian Wingate sandstone has yielded some ore at Temple Mountain, Utah, and marginal marine units of the Rico and Cutler formations are mineralized at Cane Creek, Utah. At both of these localities local faults appear to have affected ore deposition. At Skull Creek, Colorado, the Entrada sandstone has yielded ore from a unit which appears to be of marine origin. A substantial percentage of ore mined from the Monument No. 2 mine in Arizona has come from marginal marine beds in the Moenkopi formation.

Keeping these exceptions in mind, it is estimated that 90 percent of the uranium ore mined in the Plateau has come from fluvial rocks.

Favorable color—that is, practically any color except red—is an almost universal feature of ore-bearing sandstone. Probably more than 95 percent of uranium production has come from non-red rocks.

The role of carbonized wood in localizing uranium ore has been stressed by several writers. In many deposits the richest ore is concentrated around fossil plant remains. One important group of ores provides the main exception to this association—the asphaltic ores of the San Rafael Swell and Circle Cliffs area in eastern Utah. Here uranium is closely associated with tarry hydrocarbons which are thought to represent petroleum residues. In mines where asphaltic ore is being produced, carbonized wood may be abundant but it seems to have had little effect on ore deposition. Plant remains have been important in localizing about 80 percent of the ore produced in the Plateau.

The remaining two host rock features—arkosic or micaceous sandstone and interbedded sandstone and mudstone—are characteristic of probably 90 per cent of the ore mined in the Plateau. Exceptions include deposits in the Shinarump conglomerate of northern Arizona and orebodies in the Chinle formation of the San Rafael Swell, Utah. In both areas the ore-bearing sandstone has little feldspar or mica and is comparatively uniform and continuous.

Similar Deposits Elsewhere

We see then, that the five host rock features that have been described characterize probably 9/10 of the uranium ore that has been produced



Sandstone interbedded with mudstone is favorable locus for ore deposits

from the Colorado Plateau. These deposits are found in rocks of geologic age ranging from Permian to Tertiary and are scattered through large parts of Colorado, Utah, Arizona, and New Mexico. Deposits in similar geologic setting have been found in South Dakota, Wyoming, Pennsylvania, and New Jersey. To the speaker's knowledge this is the most striking example of host rock control of orebodies that has been described.

What do these host rock features show about the geologic environment in which they were deposited? The interfingering of sandstone and mudstone would be an expectable feature of rocks deposited by streams which carried both coarse and fine-grained materials. The presence of mica and/or feldspar indicates that igneous or metamorphic rocks were exposed within the area being eroded by the streams. Non-red color suggests that the sediments were deposited in a non-oxidizing environment, an environment in which atmospheric oxygen was not readily available to the sediments. This environment is also suggested by the preservation of carbonized wood. If plant matter had been attacked by air after burial it would have been destroyed before becoming fossilized in its present form. To sum up these depositional features: the ideal uranium host rock is a sandstone which was deposited under non-oxidizing chemical conditions by streams which drained region in which various rocks supplied quartz, mica, feldspar, and clays to the eroding streams.

Theories of Origin

What light can this throw on the origin of the ores? Unfortunately no definite conclusion can be drawn. A



Non-red color suggests sediments were deposited in non-oxidizing environment

direct explanation of the association between the ores and a favored rock type is afforded by the syngenetic theory of origin, a view held by many early workers in the Plateau. According to this theory the uranium was carried in some form by the streams which deposited the ore-bearing rocks. Uranium was introduced into the sediments at the time of deposition or shortly thereafter. This mechanism of uranium introduction could well explain the association of ore with a certain type of host rock—the rock represents an environment of deposition which was favorable for the precipitation of uranium from stream systems.

In contrast with a syngenetic origin

other theories call for introduction of uranium into the sediments at some time after their deposition, through the activity of ascending heated solutions from below or descending cool solutions from above. Such uranium-carrying solutions must have been quite widespread so that they came in contact with widely spaced, isolated beds of favorable rock and deposited uranium minerals there. The affinity of these favored beds for uranium was certainly marked because the same uranium-bearing solutions must have penetrated large volumes of unfavored rocks without leaving recognizable traces.

To summarize briefly, most uranium ore in the Colorado Plateau has been produced from non-red fluvial sandstones which contain carbonized wood, mica, and feldspar, and which interfingers with mudstones or siltstones. An immense volume of rocks of various other types is largely unmineralized. In view of their wide geologic range (Permian to Tertiary) and their broad geographic spread (through a number of states), the deposits represent a striking example of ore control by a favored host rock. This seems to throw little light on the origin of the deposits.

One final thought about the application of this knowledge to uranium exploration: New uranium deposits are being found every month, both in old producing areas and in new, relatively unknown areas. In old districts favorable beds have been recognized for many years. In new areas, however, knowledge of a favored host rock should aid in determining which formations are most promising for exploration. Such areas would include all the Tertiary basins of the western states.



Knowledge of favored host rock should help indicate which formations are most favorable for exploration



Confinement of force appears to be excellent on this horizontal hole stripping shot. Dust rising along the slope indicates that desired shaking and loosening of overburden is being accomplished

Photographic Studies of Open Pit and Underground Blasts Are Exploding Many Blasting Theories and Confirming Others

Camera Eyes Aid in Improving Blast Efficiency

COAL stripping operators, accustomed to watching \$1000 to \$10,000 go up in smoke and dust every time they shoot an overburden blast, are among those who are benefiting from the development of blast photography. These explosives users, ordinarily having no permanent record of how efficiently their powder costs have been expended and only able to estimate this efficiency from the results obtained, are learning much about the efficiency of various blasting techniques from photographic records of their blasts.

Photography is thus helping to fill a blind spot in blasting research and development. Without their use, blasting improvements were based on an evaluation of the results and a recollection of visual observations of the particular blast. On the spot observation of large blasts tends to be inaccurate. The human eyes, focused on only a small area, are incapable of recording the entire action, and experience has shown that several observers of the

By J. H. DANNENBERG
Atlas Powder Co.

same blast often fail to agree on exactly what has happened.

Both movie and still photographs eliminate much of this confusion and doubt: they show whether the expanding gases have been efficiently used to move burden or whether they were wasted by spouting high into the air; they expose misfired holes; they disclose improper spacing; they show whether the top or the toe of the burden moved first and point up many other blasting inefficiencies. Veteran powder men have been surprised when shown that their visual impressions of what happened during a blast were usually quite inaccurate.

Many old ideas and theories of blasting have been confirmed or exploded as a result of this recently applied medium. The advantages of initiation

at the point of maximum confinement and the superiority of split-second delay detonation over instantaneous methods are only two of many theories which have been confirmed by the accuracy of the fast modern camera.

Movie Camera Pioneers

The ordinary motion picture camera has long been used to study blasting. This predecessor of today's specialized high-speed camera was undoubtedly of great value in providing some record, if obscure, of the swiftly moving events of a blast. However, its drawbacks were numerous. Motion pictures of a blast, projected at normal speeds, are almost as confusing as is the actual observation of the blast. Slow-motion movies offer some improvement. Movie cameras, taking from 16 to 60 frames-per-second on small negatives and with exposure times of 1/100 to 1/200-second for each frame, fail to "stop" the action of the heaving and falling rock with sufficient clarity,

and still-pictures blown up from the small negatives lose much detail in the enlargement process.

High-Speed Movie Cameras

Better results have been experienced with more modern motion picture cameras. One such camera was very successfully utilized underground by the United States Bureau of Mines in their test of millisecond delay blasting at Rifle, Colo., in 1951 (MINING CONGRESS JOURNAL, June 1953). This high-speed, electrically operated camera took 128 frames-per-second, and its shutter speed was in excess of 1/200 second. By using photospot light, by painting the bench white, and by attaching 25-w lights to the face in front of the blast-holes, satisfactory underground photographs were obtained. Synchronization of the camera shutter with the electrical firing circuit provided an accurate time record of the blast and the investigators gained valuable information regarding the application of millisecond delay blasting techniques.

An even faster movie camera was used by the Dynamit-Actien-Gesellschaft of Troisdorf, Germany, in a study of millisecond delay blasting. This camera was capable of taking 1000 frames-per-second and afforded the users the opportunity to study the blast very closely. The results of the study tended to conform with the conclusions reached by studies of millisecond delay blasting in this country.

Sequence Photography

Contrasted to the motion picture camera, which provides an excellent record of the explosive action but only a fair picture of the actual fracture and movement of the rock, is the sequence camera. Taking pictures on large size negatives at a slower rate than the movie camera, the sequence camera provides large, clear photographs of each phase of the blast. These may be thoroughly studied at leisure.

One of the first successful attempts at the sequence photography of blasting was made by Luther F. Miller, now chief electrical engineer, New York Trap Rock Corp. He wired a number of solenoid operated Speed Graphic press cameras to the same time-switch he used to initiate the blast. This technique produced good results but would more than likely seem too complicated to a person lacking Miller's patience and ability. A separate camera was required for each picture, and a transformer was necessary to reduce the voltage at the switch from 110 to 6 v to operate the solenoids. In order to continue taking pictures after the time-switch had stopped it was necessary to use a relay box in conjunction with the switch and the camera. This camera technique proved valuable and useful



The K-24 camera opened the way for better blast photography

to Miller in planning shots and solving blasting difficulties encountered in the quarries under his supervision.

Sequence photography techniques have been further developed by Atlas Powder Co. Atlas tested the K-24 aerial camera and adapted it to photographic blast study. Developed by the Air Corps during World War II to record damage patterns during bombing raids, the K-24 is powered by four 6-v. batteries connected in series and takes sequence pictures automatically at intervals of $\frac{1}{3}$ -second on 5 by 5-in. negatives. Its shutter speed is 1/450-second, sufficiently fast to stop the action of the rock set in motion by the blast.

First used to study blasts in 1950, the K-24 has proven extremely valuable. Many coal stripping operators have improved their overburden blasting results by studying photos taken by the K-24. The value of millisecond

delay initiation, the importance of initiating the blast at the point of maximum confinement, and the necessity of adequate stemming have been clearly illustrated by vivid pictures produced by this camera.

Chief advantage of the K-24 is its simplicity of operation. All the operator needs to do is start the camera before the blast and leave it running until the action has ceased. Rugged, portable units and easy to load, these cameras are still available from surplus outlets. They sell for from \$200 to \$500.

However, certain limitations were apparent even with the K-24. When photographing most large shots the camera was necessarily a great distance from the blast. As a result it was very difficult to perceive perspective in the photographs, especially when they were taken, as was often necessary, directly in front of a face being blasted. This made it difficult to really tell exactly what distance the burden moved toward the camera. Therefore, despite the fact that the K-24 continued to be useful and valuable, plans were made for a new camera which would embody all of its virtues and overcome its limitations.

Blast Photos in 3-D

Based on two years' experience with the K-24, members of the Technical Division of Atlas Powder Co. drew up the specifications for their idea of the ideal camera for blasting photography. They felt that primary improvement of the new camera over the earlier sequence camera should be to provide stereoscopic viewing. This posed a problem because ordinary stereo cameras, as the human eyes themselves, are unable to perceive the third dimension at great distances. It was obvious that the camera which they



The author (left) and Norman Kennedy of Atlas work three cameras during a blast—the stereo camera at right being controlled by push button in Dannenberg's left hand. His right hand operates movie camera and Kennedy operates standard sequence (machine-gun) camera



Classic sequence photos of an efficient blast (left) and an inefficient one (right). Lack of escaping gases indicate that most of the explosive force is being used to break overburden in the good blast while geysers of smoke and dust indicate much of the blast is being wasted because of insufficient confinement in poor blast

sought was in reality two cameras mounted together and synchronized to provide stereo pairs.

The two lenses of ordinary stereo cameras are spaced the width of the average human eye—approximately 2.5 in. apart. Pictures taken with such a camera give a vivid depth effect by establishing a relationship between foreground and middle and background, but there is no third dimension in the background or at the

infinity point. If such a camera takes a picture of a subject at a great distance with no objects in the foreground or middle ground of the scene, there is no perception of the third dimension, except in the mind of the viewer. Therefore any camera designed to take pictures of objects at a great distance and to show those objects in all three dimensions must have an interocular (distance between the lenses) much greater than that of

the human eye. The lenses of such a camera must be far enough apart to shift the individual scenes sufficiently to provide stereopsis. These two cameras must not only be mounted far apart but, of course, they must also have accurately synchronized shutters. The desire for a sequential-synchronized flash bulb firing device for taking shots of blasts underground further complicated the problem.

After two years of study, work and experimentation this camera has become a reality. Developed solely and specifically to study blasts, it consists of two special sequence cameras fitted with 40-mm $f/2$ Cook Speed Panchro lenses having calibrated focusing mounts and matched focal lengths for stereoscopic photography. Each uses 70-mm film, either black and white or color. The cameras are mounted on two Dural bridge sections, and are movable on these sections so that they have a variable interocular distance of from 4 in. to 5 ft. The variable interocular distance will enable the camera to provide color stereo viewing of subjects at distances from 30 ft to infinity. The unit is electrically operated by a 12-v. D-C power source to take four synchronized sequence photographs a second at a shutter speed of 1/200 second. Three units make up the camera assembly. The camera unit consists of the two cameras which are mounted on individual tripods and interlocked by the Dural bridge section. A synchronizer unit coordinates the sequence loading, triggering and flash synchronization. A battery pack supplies the necessary power. In addition, a remote triggering cable is provided.

The stereo pairs taken by this camera, when shown by a special projector, allow the viewer to see the separate phases of the blast in all three dimensions.

Atlas technical men are already pleased with the results of test runs of the camera. They expect it to contribute even more toward improving the knowledge of blasting techniques than has the old K-24 during its four years of operation.

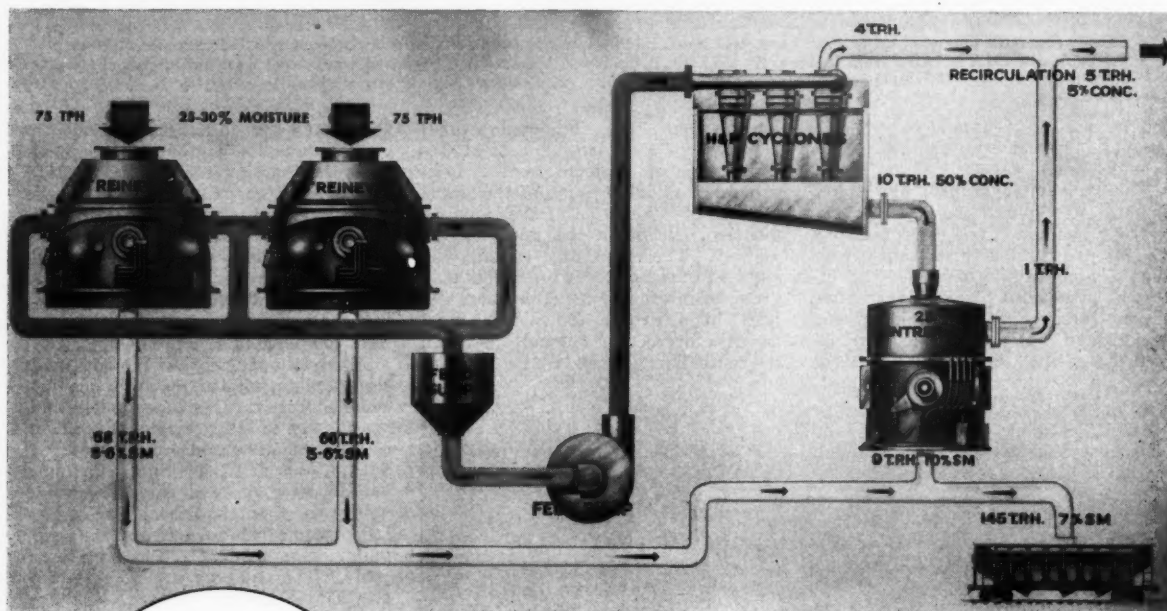


This illustration and the one below were taken in sequence of the same blast. "Rose bushes" (above) indicate poor confinement of expanding gases



Taken one-third second after the one above, this photograph indicates, by the gaps between the geysers of rock and dust, that the spacing between holes was too great

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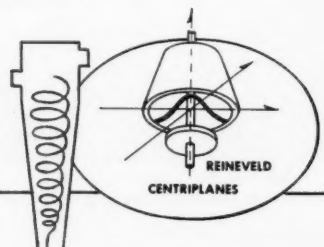
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Wheels of GOVERNMENT



As Viewed by HARRY L. MOFFETT of the American Mining Congress

BOTH Houses of Congress are whitening away at a huge mass of major legislative proposals, with only one or two of them likely to clear the capitol before the Easter recess, April 3-13.

Forward strides are being registered in getting appropriations bills to the floor, but thus far only one—the Treasury-Post Office bill—has come up for consideration.

The Eisenhower "honeymoon" with Congress is definitely over. Political overtones appear more and more as both parties jockey for position with the voters in next year's Presidential election. Nor is the political color confined to domestic issues such as taxes and tariff. It has now extended to foreign policy matters, particularly since the release of the long-secret Yalta documents. All in all, it is likely that the Administration will face hard political battles in the months ahead to write its legislative program into law.

Tax or Untax?

The President won a victory in the Senate in his struggle to renew for another year the 52 percent corporate tax rate and present excises on liquor, gasoline, automobiles, and cigarettes. The upper chamber narrowly defeated amendments which would have repealed the accelerated depreciation provisions of the 1954 law; eliminated the dividend credit and exclusion provisions of that law, and provided a \$20 tax credit for each taxpayer and a \$10 credit for each dependent for taxpayers not utilizing the split-income provisions of the law.

Following approval by the Senate the bill was sent to a House-Senate conference committee where it is likely that the \$20 per person tax cut approved by the House will be eliminated and the measure sent to the White House in the form originally sought by the President.

However, the Administration is not yet out of hot water over taxes. Leading House Democrats had called the attention of the Treasury Department to two provisions of the 1954 revenue

revision law which they said would permit windfalls to business taxpayers. These provisions, it was claimed, would reduce revenues by up to \$1 billion annually. The sections of the law in question relate to prepaid income and reserves for estimated expenses. Brief hearings were held before the House Ways and Means Committee and a measure to repeal these two provisions was reported to the House. Treasury Secretary Humphrey supported the bill, declaring that the two provisions were never intended to result in any substantial loss of revenue but were sponsored to reconcile tax accounting and business accounting.

When the bill comes up for House debate it is likely that efforts will be made to tack on riders providing for repeal of the \$50 dividend exclusion and four percent dividend credit provisions of the present law, and adding a \$20 per person tax cut. Whatever may be the result, the sponsors of these moves expect to use them as political capital in the coming campaign.

Ike's Trade Bill Shaky

Lengthy hearings before the Senate Finance Committee of the House-approved bill, H. R. 1, to extend the Trade Agreements Act for three years and broaden the Executive's authority to reduce tariffs, have made one fact crystal clear—the President's proposals are in for rough sailing in the Senate and amendments to protect domestic industries from serious injury from foreign imports are a distinct possibility.

Administration witnesses, including Secretary of State John Foster Dulles, have testified that the trade bill is needed as an instrument of foreign policy. Their remarks have been echoed by some industry spokesmen seeking less trade restrictions and added outlets for their products. But this testimony has not made the impression upon the lawmakers that that of hard hit domestic industries has registered. A wide range of indus-

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Washington Highlights

TAXES: President wins round.

TRADE ACT: Senate revision possible.

UNEMPLOYMENT HEARINGS: Domestic industries hard hit.

FUELS POLICY: White House releases report.

MINERALS ADVISORY COUNCIL: Proposed.

GAS REGULATION: Hearings under way.

RENegotiation: Extension sought.

MINING-OIL LAW: Regulations proposed.

★ ★ ★ ★ ★ ★ ★ ★

tries, from textiles to mining, has sent a parade of witnesses before the Committee to demonstrate that imports are playing havoc with domestic production and employment. It appears that, for the first time since enactment of the Trade Agreements Act in 1934, extended consideration will be given to strengthening the Act to provide some measure of relief to U. S. industries in the face of foreign inroads.

The mining industry has made an excellent showing before the Committee. President Howard I. Young of the American Mining Congress recommended that the Act be allowed to expire on June 12 of this year, and urged that, if it is to be extended, adequate provision be made to assure maintenance of a proper "mobilization base" in the metals, minerals and fuels industries. He recommended that the Act be amended to transfer the authority for approving or rejecting "escape clause" and "peril point" recommendations of the Tariff Commission from the Executive Branch to Congress. Supporting this recommendation, he told the Committee that the mining industry was made painfully aware of the failure of the escape clause to provide the relief it was

intended to give. He cited lead and zinc as a case in point, declaring that the President had disregarded the unanimous findings of the Tariff Commission for escape clause relief last year, and that the "long-range" stockpile program, while it had given material help, was clearly a temporary measure. Young also stated that reductions of duties on strategic and critical minerals have proved serious deterrents to domestic mine production, and urged that further duty reductions be prevented and higher rates established in order to offset sharp rises in labor and other costs in the United States. He referred to the serious harm being done to the coal industry by excessive imports of residual oil and said that the impact of these imports and suggested remedies would be fully brought out by a later witness representing the Coal Division of the American Mining Congress and other coal organizations.

Julian D. Conover, executive vice-president of the Mining Congress, told the Committee that even if the Trade Agreements Act should be permitted to die, authority to pass on escape clause recommendations should be transferred from the Executive to the Congress, since all existing trade agreements would continue in force and industries suffering from excessive imports should be able to obtain relief without such action being subject to a Departmental veto.

Chairman Otto Herres of the National Lead-Zinc Committee outlined the injury suffered by the domestic lead and zinc industries as a result of excessive imports and urged the imposition of an import excise tax on these minerals whenever imports cause market prices to fall below the levels needed to maintain an adequate mobilization base.

Spokesmen for the coal industry, including Daniel T. Buckley, who represented the National Coal Association and the American Mining Congress; Walter J. Tuohy, president, Chesapeake and Ohio Railway Co.; Frank W. Ernest, Jr., president of the Anthracite Institute; and Thomas Kennedy, vice-president, United Mine Workers of America, outlined the serious effect that dumping of foreign residual oil on U. S. markets has had upon the domestic coal industry. They showed that residual oil imports have created widespread unemployment, lowered rail shipments and revenues, and undermined coal markets. Strong recommendations were made for a limitation on imports of residual oil to 10 percent of domestic demand, based on consumption for the previous year.

A strong plea for relief for the domestic lead and zinc industries was also made by Miles P. Romney, manager of the Utah Mining Association.

In the face of this telling testimony and that from other affected indus-

tries, key leaders in the Senate have voiced the opinion that the upper chamber may make considerable revision of the President's bill and write into the measure some amendments to afford protection for domestic producers.

Unemployment Hearings

On another front, closely allied to consideration of the trade agreements measure, a host of industry witnesses and members of Congress from industrial areas have been appearing before a Senate Subcommittee headed by Senator Neely of West Virginia inquiring into causes of unemployment in basic industries.

Representatives of the coal, lead, zinc, fluorspar and petroleum industries have testified that unemployment has been on the increase, primarily as the result of excessive imports. Spokesmen for labor unions have also declared that unemployment is on the rise due to foreign competition.

Coal witnesses have pointed out that the coal industry has experienced a decline in production from 631 million tons in 1947 to 390 million tons in 1954 despite the fact that energy consumption reached a very high level in 1954. They have shown that the drop in production has resulted in the closing of a large number of mines with attendant loss of employment for thousands of workers. They told the committee that this problem cannot be solved by the industry and that the Government should step in to provide protection against the unfair competition of foreign oil "produced by labor working below American standards and carried in shipments under foreign flags manned by cheap labor."

Representatives of the lead and zinc mining industries have pointed to the failure of the President to afford relief from foreign imports under the escape clause procedure for domestic mines, even though the Tariff Commission had recommended such relief. They called for the imposition of an excise tax on foreign imports which can be suspended when the market reaches prices of 15 cents per lb for lead and 13 cents per lb for zinc. As in the case of the coal witnesses, they pointed to the closing of a large number of mines and the increase in unemployment in many areas.

It is expected that the Committee will make strong recommendations for tariff protection for basic American industries which are suffering serious unemployment as a result of harmful foreign competition.

Fuels Policy Released

The fuels report of the Cabinet Committee on Energy Supplies and Resources remains at the White House and no action has as yet been taken to either approve or supplement the

recommendations made. In fact the President, at a recent press conference, said the report was simply a study and he has not given it final approval.

The report has been released to the public. It contains a number of recommendations designed to maintain a strong mobilization base for the coal, oil and natural gas industries. As previously reported, it called for voluntary limitation of residual oil imports by the importing firms at a level not exceeding the proportions that such imports bore to 1954 domestic production of crude. It also made it clear that the Government would make every effort to avoid "governmental intervention." The report called for a study of the tax laws as they apply to these industries with a view to recommending changes that will continue development of domestic resources; for further research for additional uses for coal; for lowered freight rates on coal; for expansion of coke production; and for increased use of coal by Federal facilities.

Minerals Council Proposed

Reestablishment of the National Minerals Advisory Council is the objective of a bill introduced in the Senate by Senator Alan Bible (Dem., Nev.). The Nevada solon said the council should be set up to aid in carrying out recommendations made late last year by the President's Cabinet Committee on Minerals Policy.

Measures to reestablish the council have been introduced in past Congresses but have failed to be approved on the grounds that payment of members would create a precedent for the formation of countless advisory groups throughout the Government establishment. The President's Cabinet Committee is on record for the formation of advisory committees, and it is possible that this year may see the return of mining advisory groups with some voice in the formulation of policies affecting the mineral industry.

Natural Gas Regulation

Hearings have started before the House Interstate and Foreign Commerce Committee on measures dealing with natural gas regulation. The two principal measures before the committee are (1) a bill by Rep. Harris (Dem., Ark.) which would exempt producers and gatherers of natural gas from Federal regulation and would nullify the Phillips decision, in which the Supreme Court had held that gas producers are subject to the jurisdiction of the Federal Power Commission; (2) a bill by Rep. Staggers (Dem., W. Va.), which would authorize FPC control over direct industrial sales of natural gas in interstate commerce, would subject imported natural gas to the same re-

(Continued on page 126)

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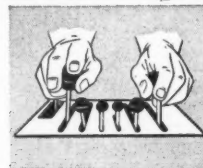
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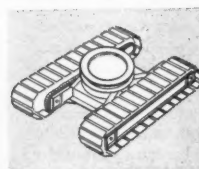
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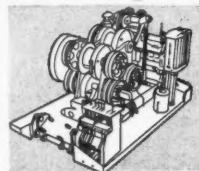
Speed-o-Matic, the true power-hydraulic control—smooth, positive response—perfect “feel” for speed with accuracy. Engineered to consider the human factor, greatly reduces operator fatigue.

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Personals

Harry O. Zimmerman has been appointed manager of coal properties, Inland Steel Co., succeeding the late John T. Parker. Zimmerman has been with Inland Steel since it acquired its first coal property at Wheelwright, Ky., in 1930. He served as chief engineer from that time until he was appointed assistant to the manager of the coal properties last year.

The New Jersey Zinc Co. announces the election of **Sidney S. Goodwin** as a director, and **Lindsay F. Johnson** as vice-president.

Goodwin is vice-president in charge



S. S. Goodwin



L. F. Johnson

of mining and exploration. He is a veteran of 24 years' service with the company.

Johnson served for many years in employe relations activities and, since January 1, 1954, as assistant to the president. He has been with the company for 13 years.

Henry Lewis Restarick has been named superintendent of the Marquette Cement Mfg. Co. plant at Superior, Ohio. He succeeds **William Moyle**, who, formerly acting superintendent, is now project supervisor of the operations department of the company.

Hugh Wright is the new executive secretary of the Tri-State Zinc & Ore Producers Association, Picher, Okla.

R. Grant Fleck, who has been associated with the Benson Mines development of the Jones & Laughlin Steel Corp. at Star Lake, N. Y., since 1946, is now manager of the New York Ore division of the steel corporation. Fleck, who was assistant manager, succeeded **William R. Webb**. Fleck is replaced as assistant manager by

Roland E. Durocher, formerly plant metallurgist at the Adirondack development.

Don Saxton, formerly superintendent of the Georgetown mine for Hanna Coal Co. Division of Pittsburgh Consolidation Coal Co., has joined Compton, Inc., in West Virginia, as vice-president.

Edward D. Dickerman was elected president of the Colorado Mining Association at the annual meeting of the association in Denver early in February.

Other officers elected were **M. P. Cloonan**, first vice-president; **G. T. Rummel**, second vice-president; **Max W. Bowen**, third vice-president; **W. E. Burleson**, fourth vice-president; and **D. W. Viles**, fifth vice-president.

Stuyvesant Peabody, chairman of the board of the Peabody Coal Co., announced his resignation March 1 following a directors' meeting of the company.

Election of **M. M. Hardin** of Albuquerque, N. M. as a director of Kennecott Copper Corp. has been announced



M. M. Hardin

by **Charles R. Cox**, president. For many years Hardin has had extensive business interests and has been a leader in civic and community affairs in New Mexico where one of Kennecott's major properties, Chino Mines Division, is located.

A native of Texas, Hardin is a graduate of Southwestern University, Georgetown, Tex.

Christian F. Beukema is now president of Michigan Limestone Division of United States Steel Corp.

Beukema, who had been vice-president of Michigan Limestone, succeeded **Hugh S. Lewis**, who continues with U. S. Steel in a consulting capacity.

John C. Best, vice-president of National Gypsum Co., Buffalo, N. Y., and former president of Best Bros. Keene's Cement Co., retired from active business February 28.

Best joined National Gypsum as vice-president of the Industrial Division in 1938 when National purchased the Best Bros. Keene's Cement Co. plant and gypsum deposits at Medicine Lodge, Kan.

Pittsburgh Consolidation Coal Co. has announced that its board of directors elected **J. W. Kepler** to the position of vice-president—sales, effective April 1. Kepler, who succeeds the late **Harry S. Matthews, Jr.**, has been



J. W. Kepler



J. W. Oliver

vice-president and general manager of United Eastern Coal Sales Corp. in New York City.

The directors also elected **Joseph W. Oliver** to the position of vice-president—public relations and personnel, effective March 1. Oliver had been assistant to the president and will continue in that capacity.

William Wallace Mein, Jr., president, Calaveras Cement Co., San Francisco, Calif., has been elected vice-president of the American Institute of Mining, Metallurgical and Petroleum Engineers. The only Institute officer from the West, Mein will represent the mining branch and will serve for a three-year term ending in the spring of 1958.

Ted Becker has resigned as chief mining engineer for American Zinc, Lead & Smelting Co. at its Grandview mine in Metaline Falls, Wash. and joined Loma Uranium Corp. of Denver, Colo. as geologist and mining engineer.

Edward C. Carris, associated with Roberts & Schaefer Co. since 1947, has resigned and is opening a new mining engineering consulting agency in Charleston, W. Va.

Carris first became associated with the coal industry as an engineer for the Houston Coal Co., Elkton, W. Va. He occupied a similar position with the American Coal Corp. and later became general manager for the American Coal Cleaning Corp. and then was appointed director of preparation for the Island Creek Coal Co. and its subsidiaries before joining Roberts & Schaefer.

Walter C. Bennett, who has been president since 1935 is now chairman of the board of directors of Phelps Dodge Refining Corp. **Carleton S. Harloff**, executive vice-president, was elected president of the corporation. Bennett will continue as chief executive officer of the organization. Under Bennett, Harloff will be executive officer responsible for operations.

F. B. Bowen, manager of the Florida Phosphate Dept. for International Minerals and Chemical Corp., has been advanced to the newly-created position of production manager of the Phosphate Minerals Division of the company. Bowen will supervise from his headquarters in Bartow, Fla., the production facilities in both the Florida and Tennessee phosphate departments.

Henry F. Warden, president of the American Coal Co. of Allegheny County, W. Va., has announced the appointment of **John B. Farquharson** as general superintendent of mines. The company operates mines in Mercer and Wyoming Counties, W. Va.

The appointment of **S. A. Huffman** as superintendent of mechanical maintenance has been announced by Reserve Mining Co., Duluth, Minn. Huffman, prior to joining Reserve at Silver Bay, Minn., was superintendent of the mechanical departments of a large West Coast steel plant.

At the same time the appointment of **John A. Smrekar** as supervisor of Industrial Relations for operations at Babbitt, Minn., was made. Smrekar, formerly of Ely, was employed by Reserve three years ago as chief interviewer. In March 1954, he was advanced to supervisor of employment.

Dr. Frank R. Hunter has been appointed division geologist for the Industrial Minerals Division of International Minerals & Chemical Corp. He will direct an expanded exploration program for the division.

Edward G. Fox, president of The Philadelphia and Reading Coal and Iron Co., recently announced that **Patrick H. Burke**, has resigned as a director of the company. Burke was senior member of the board in point of service, having been elected to the board originally in November 1935.

Benjamin D. Palmer, of Alexander Brown & Sons, Baltimore, Md., was elected a director to fill the vacancy caused by Burke's resignation.

Thomas C. Cheasley, 65, vice-president of the Sinclair Coal Co., Kansas City, Mo., died March 17 at his winter home in Ft. Lauderdale, Fla.

Born in London, England, Mr. Cheasley was prominently identified with the domestic coal mining industry for many years and had served on numerous industry committees. Among these assignments he was a member and first chairman of the Land and Water Use Technical Committee of the American Mining Congress. In addition he served on the

Land and Water Use Advisory Committee of the U. S. Chamber of Commerce and the Natural Resources Committee of the U. S. Chamber of Commerce.

He was the author of many technical papers and articles and held several patents. The American Society of Mechanical Engineers had nominated him to receive the Grade of Fellow later this year in Washington, D. C.

Much of Mr. Cheasley's activities in recent years had been directed toward the rehabilitation and reclamation of coal lands disturbed by surface mining operations. His efforts in this direction were untiring and will be sorely missed. The entire mining industry lost a good friend and able worker with the passing of Tom Cheasley.

H. Edward Dangerfield, 84, a former Joplin, Mo. mine operator, died February 18 in Mentone, Calif. At one time Mr. Dangerfield was associated with the Middlesex Mining Co.

Walter N. Wetzel, 70, long active in the coal industry of the West, died late in January at Price, Utah.

Born in Dakota, Ill., in 1884, Mr. Wetzel attended Pennsylvania State College. He first came to Utah in 1908 as superintendent of the Castle Gate No. 2 mine. From 1913 to 1918 he was superintendent at Sunnyside mine, then became general superintendent of the Ohio-Collieries Co. at Athens, Ohio. In 1920 he returned to Utah as a general contractor in Salt Lake City and Price. In 1927 to 1935 he was superintendent at Mohrland for the United States Fuel Co. Then he became general superintendent of U. S. Fuel Co. mines, a position he held until 1942.

In 1942 Mr. Wetzel returned to Sun-

nyside in charge of operations and new developments for the Utah Fuel Co. He transferred to Castle Gate in 1943 and there established a consulting engineering firm.

He was past president of the Rocky Mountain Coal Mining Institute and his many contributions to coal mining will be long remembered.

Gen. Brehon Burke Somervell, 62, (ret.), commander of the army service forces in World War II, and since his retirement from the army in 1946, president and chairman of the board of Koppers Co., Inc., died at his winter home in Ocala, Fla., February 13.

Norman B. Perkins, 76, widely known coal-mining executive, died February 5 in Orlando, Fla.

One of the organizers of Appalachian Coals, Inc., Cincinnati, the world's largest coal distributing agency, Mr. Perkins was operator of extensive coal properties in Eastern Kentucky and Tennessee. A resident of Williamsburg, Ky., he was executive vice-president and general manager of Southern Mining Co.'s group of mines in Bell County, Ky., and president of Perkins-Bowling Coal Co. in Knott County, Ky. He was also chairman of the board of Perkins Harlan Coal Co. of Williamsburg and Secretary of Southern Coal and Coke Co., Knoxville.

Elton Hoyt, II, 66, senior managing partner of Pickands Mather & Co., Cleveland, died March 16. Mr. Hoyt, who was a leading spokesman for the iron ore and lake shipping industries, had been identified with his firm for 44 years.

In 1911 Mr. Hoyt joined Pickands Mather & Co. as an office boy. Later in the same year he became an iron ore salesman. After working in the company's various departments he was admitted as a member of the concern in 1922. In 1929 he was elected a managing partner and became senior partner in 1939.

Early last year Mr. Hoyt was awarded the much coveted Gary medal for distinguished service in the iron and steel industry. He was the first person outside the immediate limits of that industry to receive this honor. One of his outstanding accomplishments was his work during the last war in organizing the Lake Vessel Committee, which regulated vessel traffic on the Great Lakes through the wartime period. He was also president of the Mather Iron Co. and the Interlake Steamship Co. and a director of Interlake Iron Corp., Youngstown Steel Door Co. and the Pittsburgh & Lake Erie Railroad.

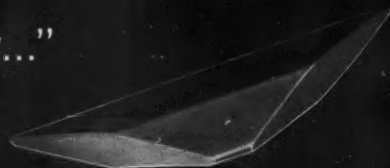


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AIME President Reinartz, Armco Steel Corp., presents the Erskine Ramsey Medal to Geo. H. Deike, Mine Safety Appliances Co. (left picture) and the James Douglas Medal to Edwin Letts Oliver, Dorr-Oliver, Inc., (right photo) as Andrew Fletcher, St. Joseph Lead Co. president, looks on

AIME Meets in Chicago

THE American Institute of Mining and Metallurgical Engineers emerged from its national meeting in Chicago in mid-February as The American Institute of Mining, Metallurgical and Petroleum Engineers. The change in name was adopted in recognition of the large and increasing number of its members who are in the oil producing industry.

In the five days from Sunday, February 12, through Thursday, February 17, more than 2000 engineers and geologists from every part of the world attended the 87 technical sessions and panel discussions to hear more than 340 papers on a host of subjects. These were all related to the production of the metals and non-metallic minerals and fuels upon which our society depends for the high standard of living we enjoy.

The subjects covered included such topics as the use of helicopters for prospecting in the Yukon; uranium occurrences in the Eastern United States; geologic considerations in disposal of atomic wastes and the attractions foreign mineral resources seem to have for American risk capital. New processes for handling titanium and zirconium as well as the traditional metals and minerals were also the bases for a number of the

papers. There was also a wide variety of papers on industrial minerals and coal from which to choose. And it was necessary to choose, for many of the sessions ran concurrently.

Throughout the entire program there was noted a preoccupation with the question "where are the engineers of the next generation coming from and how are they to be trained?" At least one lively and interesting session was devoted to this topic exclusively.

According to tradition the Institute took the opportunity afforded by its national meeting to pay homage to members who had rendered conspicuous service to the industry, through the award of medals and citations, and in some cases with cash prizes. Some of these were presented at the Welcoming Luncheon on Monday. Others at the Annual Banquet on Wednesday while still others were presented at special ceremonies.

Among prominent mining men so honored were: E. D. Gardner, U.S. Bureau of Mines, who received the Daniel C. Jackling Award and delivered the Daniel C. Jackling Lecture; E. L. Oliver, Dorr-Oliver Inc., who received the James Douglas Medal; Dr. S. J. Cort, Bethlehem Steel Co., who was recipient of the

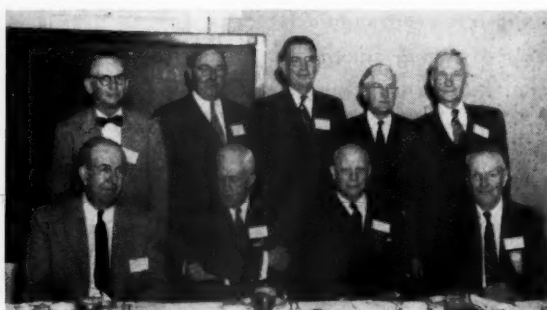
first Benjamin F. Fairless Award; G. H. Deike, Mine Safety Appliances Co., to whom the Erskine Ramsey Gold Medal was presented; E. W. Davis, professor of Metallurgy at the University of Minnesota received the Robert H. Richards Award for his work on taconite. The Robert E. Peele Memorial Award was shared by R. E. Thurmond, W. E. Heinrichs, Jr., and E. D. Spaulding. The Howe Memorial Lecturer this year was J. S. Marsh, Bethlehem Steel Co. and the Annual Lecturer of the Institute of Metals Division was Clarence Zener, Westinghouse Electric Corp.

At the Annual Banquet on Wednesday night Leo F. Reinartz, Institute president, turned the presidency over to his successor H. DeWitt Smith, Newmont Mining Corp. Carl E. Reistle, Jr., Humble Oil & Refining Co., became President-Elect of the Institute and will take over as President at the meeting in New York in 1956.

At this meeting it was also announced that Edward H. Robie, for 30 years an Institute employe and for many years—its Executive Secretary, was officially retiring from that position and that Ernest O. Kirkendall, secretary of the Metals Branch would take over the duties of executive secretary. "Ed" Robie however, will continue with the Institute as Secretary-Emeritus.



E. D. Gardner, U. S. Bureau of Mines, receives Jacklin Award from Tell Ertl, Ohio State University, in presence of new AIME president H. DeWitt Smith, Newmont Mining Corp.



At Coal Division luncheon: seated J. E. Tobey, J. B. Morrow, L. F. Reinartz, M. D. Cooper; standing are H. F. Yancey, new Coal Div. chairman, C. T. Hayden, D. R. Mitchell, C. E. Lawall, W. B. Gelse

NEWS

and VIEWS



Eastern and Central States



Freeport Sulphur and Pittsburgh Consol Join Hands to Produce Potash

A joint undertaking to produce potash from a substantial deposit near Carlsbad, N. M., was announced February 28 by Freeport Sulphur Co. and Pittsburgh Consolidation Coal Co.



R. C. Wells

A new company, National Potash Co., has been formed to conduct the undertaking, according to the announcement by Langbourne M. Williams and George H. Love, respective presidents of the parent companies. Richard C. Wells, Freeport vice-president and controller, will be president of National Potash. Thomas G. Ferguson, formerly a vice-president of one of Pittsburgh Consol's divisions, Pittsburgh Coal Co. will be operating vice-president of the new company.

The project, including mine, plant and related facilities, will call for an estimated capital outlay of \$19,000,000. Facilities will be designed to produce potash containing the equivalent of approximately 250,000 tons of potassium oxide per year.

Pittsburgh Consolidation Coal Co. is a producer of bituminous coal and

Freeport Sulphur Co. is a producer of sulphur.

The area in which National Potash will conduct its operations in New Mexico is about 32 miles east of Carlsbad on the Lea and Eddy county line. The company has taken over potassium leases awarded Freeport by the Department of Interior on 12,775 acres. It also has taken over federal permits and state leases on additional acreage.

Freeport discovered the potash deposit in exploratory drilling begun in 1949. Some 60 core tests, involving more than 100,000 ft of drilling, have been completed.

Pittsburgh Consolidation Coal Co. will bring to this operation its broad experience in coal mining, in which the same machines and mining technique are employed as in the mining of potash.

About two years will be required by National Potash to sink shafts, build a refinery and related facilities, and install a 21-mile water pipeline. Production is scheduled to begin in 1957.

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Gas Storage

A bill designed to provide greater safety for coal mines operating in the vicinity of natural gas storage pools has been introduced into the W. Va. House of Delegates. The proposal would provide for regulation and general supervision under the State Mines Department of the operation of underground gas storage reservoirs beneath or within 2000 ft of an operating coal mine other than strip and surface auger operations. It would make no change in present drilling and plugging laws.

Open Gypsum Deposit

The Frazier-Davis Construction Co. of St. Louis has contracted to sink a slope to reach newly found gypsum deposits near Shoals, Ind. The slope will be approximately 2000 ft long and will dip 17° to reach a vertical depth of approximately 596 ft. It is being driven 22 ft wide and 12 ft high.

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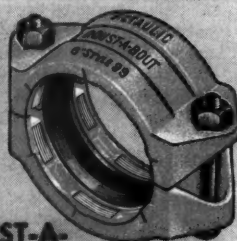
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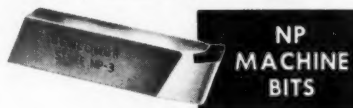
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Add Kiln

The Giant Portland Cement Co. with offices in Philadelphia, Pa., has announced the recent completion of the installation of an eighth kiln at its plant in Egypt, Pa. This kiln was originally part of the equipment acquired by the company when it purchased the Harleyville, S. C., property. The kiln and its appurtenances were shipped to Pennsylvania since it was not economically adaptable to the Harleyville operation.

To Use Process Refuse

Construction has begun on a plant at Ceredo, W. Va., designed to process refuse from the Ceredo coal preparation plant of Truax-Traer Coal Co. into aggregate for concrete and concrete blocks. The first of its kind in the United States, the plant will be built by the newly organized Turlite Corp., headed by Charles N. Howard, formerly with Truax-Traer, who developed the process in cooperation with the U. S. Bureau of Mines.

To Close Iron Mine

Oliver Iron Mining Division plans to close its Godfrey underground mine near Chisholm, Minn., by May 1, R. T. Elstad, president of the U. S. Steel mining division reported. Removal of mining equipment from some of the working places has already begun in preparation for the shutdown of the property.

The Godfrey mine is being closed, Elstad explained, because it has become uneconomical to operate under present conditions. High cost of the ore, of which taxes constitute a substantial item, and the decline in ore quality has made the continuance of operations not practicable.

Closing of the Godfrey marks the second underground mine Oliver has closed in the past six months. The Fraser, located east of Chisholm, ended its operations last fall because it, like the Godfrey, could no longer be mined economically.

Since the first ore was shipped from the Godfrey in 1927, 11,500,000 tons have been produced. Some 300 employees will be affected by the shutdown. Efforts will be made to provide employment for these men in the division's surface operations providing their length of service permits it.

Closing of these two underground operations employing a total of 445 men is significant, Elstad said, because with the use of the most modern equipment and best mining methods the company was unable to make these underground ores competitive with ores from other sources. To date, efforts to interest other mining operators to take over these equipped operations have failed.

The inability to keep these mines operating, he said, is of concern to us

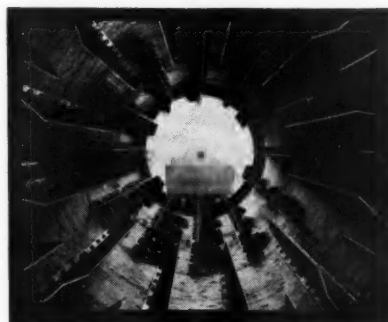
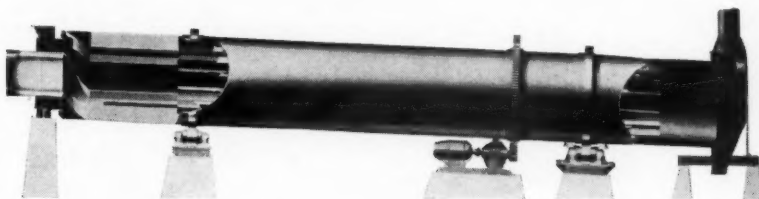
and to our mining communities which are largely dependent upon them for support. It brings to public attention the need for an entirely different approach to mining problems in Minnesota if lower grade ores and borderline properties are to be developed in competition with the newer fields of high grade ore.

Oliver plans to continue operating its underground Pioneer Mine at Ely and the Soudan at Tower, Minn., Elstad said. Both are on the Vermilion range.

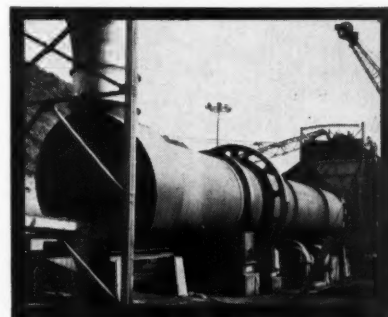
Honor Long-Time Employees

More than 5000 years of working in the mines of West Virginia and Pennsylvania are represented by 221 Eastern Gas and Fuel Associates mine workers who in 1954 received awards for having completed from 20 to 40 years of service with Eastern and predecessor mining organizations.

Each veteran worker received a gold lapel pin or button bearing his years of service and a gem.



Interior of shell of "XH" Ruggles-Coles Dryer showing lifting flights and "knock-out" chains.



10' diameter, 80' long "XH" Ruggles-Coles Dryer drying bauxite.

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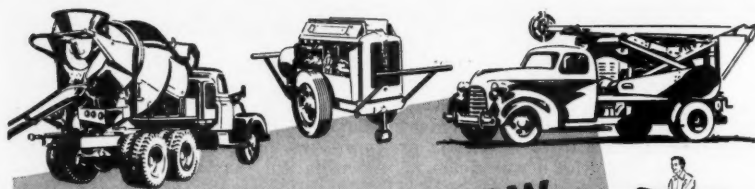
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Complete specifications upon request. Ruggles-Coles Dryers are described in Bulletin AH-438-52

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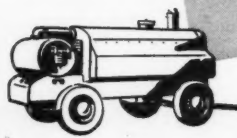
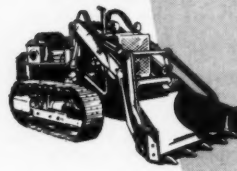
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Modernize Cement Plant

In its annual report, North American Cement Corp. revealed plans for an extensive construction program at two of its plants in 1955. A preheater for one of its kilns will be built at its Security plant as will new stone driers and an additional raw grinding mill.

At the House Cave, N. Y. plant conversion of operations from a wet to a dry process is planned. This should substantially increase capacity and lower fuel consumption. Other proposed improvements at House Cave include a new kiln, a completely new raw grinding department, a covered storage for raw materials and clinker, and a new electrical distribution system.

Congratulations Kentucky

Not a single coal mining fatality was reported in Kentucky during the month of January. To be exact, the State went 55 days without a fatal accident, according to A. D. Sisk, chief of the Kentucky Department of Mines and Minerals. He said the performance between December 7, 1954 and February 1, 1955 was due to increased safety-mindedness on the part of miners, operating officials, coal associations and others.

Woodward Looks to New Ore

In its annual report for 1954, the Woodward Iron Co., Woodward, Ala., announced that by reason of approaching depletion of its presently developed sources of iron ore, development of a new area known as the Wildwood property is now receiving preliminary study. The property is in the area which can be served by the company's transportation system. While the ore reserves in this territory are substantial, the character of the ore renders it unsuitable for economical consumption in blast furnaces without preliminary concentration.

It was also announced that present railroad facilities and many of the cars are approaching the point where extensive rebuilding and replacement will be necessary in order to maintain operating efficiency. Improved facilities for stocking and reclaiming raw materials are also being planned.

Consolidate Iron Mines

Plans are well under way for the consolidation of the Maas and the Bunker Hill underground mines in Negaunee, Mich., on the Marquette iron range according to a recent announcement by the Cleveland-Cliffs Iron Co. When the necessary arrangements have been made, ore will be hoisted through the Bunker Hill shaft. Bunker Hill now handles ore from both the Athens and Bunker Hill ore-bodies.

Under present plans, the Maas mine shaft and surface will continue on a development and reduced production basis while the work of consolidation is under way.

Will Build Cement Plant

Peerless Cement Co. plans the erection of a new cement plant with an annual capacity of 1,000,000 bbl in metropolitan Detroit, according to a recent announcement. It was indicated that construction will start soon and that cement will be available for distribution late in 1956 or early in 1957.

House-Cleaning for Safety

According to recent reports, Britain's National Coal Board is testing a new mobile vacuum cleaner for coal mines. The idea is for the vacuum cleaner to pick up broken coal and dust along the mine roadways and thus reduce the danger of coal dust explosion.

Ready for Lake Season

The 59-ship fleet of Pittsburgh Steamship Division, U. S. Steel Corp., was to open the shipping season April 4, weather and ice conditions permitting.

In announcing that the entire fleet would go into operation this year, D. C. Potts, president of the division, said there is every indication the 1955 shipping season will exceed that of 1954 in larger tonnages of raw materials to be transported on the Great Lakes.

Engineers of the fleet started to board the ships on March 16, while deck officers went aboard on March 22.

Progress at Corbin Washer

First structural steel for U. S. Steel Corp.'s coal preparation plant at Corbin, Ky., was being unloaded from railroad cars in mid-February.

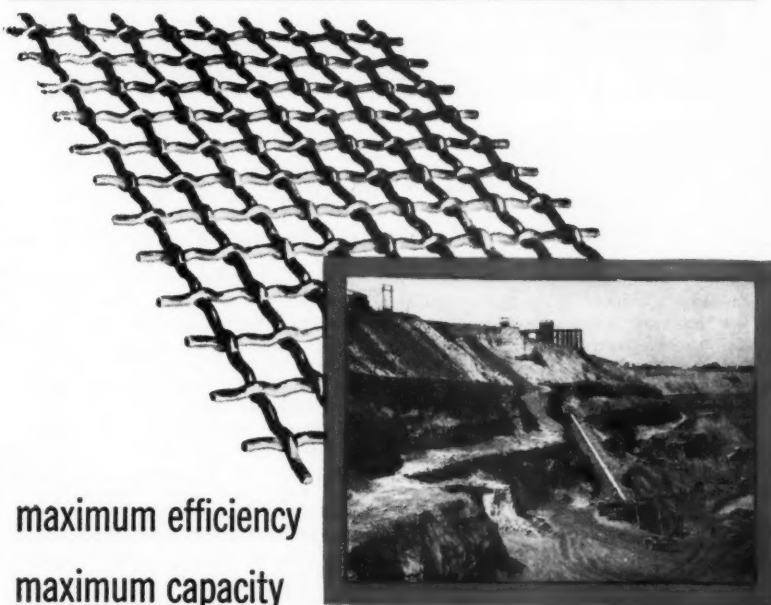
Ground was first broken for the cleaning plant's construction on August 3, 1954. Since then, 90 percent of the excavating has been done, half of the footings for the 14-story structure have been poured and 25 percent

of the work completed on the concrete unloading station which will receive coal from the Harlan County, Ky., operations of the steel corporation.

Construction of dikes to provide settling pools for waste materials is complete. The remaining 10 percent of earth work to be done includes the completion of an access road. Also to be completed is the grade for the railroad in and out of the cleaning plant.

Allen & Garcia Co., Chicago, holds the general contract for construction of the plant which has been named the Corbin Washer by U. S. Steel. It is expected to be completed early next year and will have a coal cleaning capacity of 12,500 tpd.

The plant will be a heavy-media plant with all feed being crushed to a top size of four in. Fine coal will be treated on tables, filtered and heat-dried. Refuse will be transported hydraulically to the settling pool.



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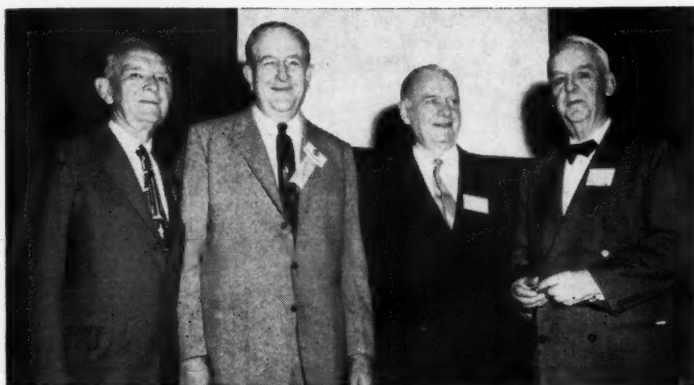
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Chairman of the morning session was C. C. Dickinson, Sr. (far right). The three speakers were (left to right) J. D. Francis, J. E. Tobey and Gen. W. J. Donovan



C. C. Dickinson, Sr., among others, received an award from ACI President J. E. Tobey

ACI Meets

APPALACHIAN Coals, Incorporated, the world's largest coal marketing agency, has achieved its "majority." On March 4 more than 300 business and industry leaders met in Cincinnati to celebrate the organization's 21st Anniversary. They formed an interested and appreciative audience at each of the morning and afternoon sessions, and a luncheon; then wound up the day's festivities at a banquet in the evening.

First speaker at the morning session was Julian E. Tobey, President of Appalachian Coals, Inc. He recalled the "perilous times" during the early Thirties when the Agency got its start. Tobey reminded his listeners that the coal industry then was in danger of complete Government control and observed that the free enterprise answer to this threat was the regional marketing agency. He pointed out that today the coal industry, with its profits greatly reduced and production at a level too low for national safety, is again in a position comparable to that of the early 1930's. This meeting, he said, was planned to provide a firsthand picture of what ACI has done for its members and

the nation and to outline what it can and will do in the future.

The agency, he said, has weathered every storm to maintain orderly marketing procedures in the face of chaotic conditions. It has marketed 600,000,000 tons of coal in 31 states and in all the free countries of the world which buy American coals.

Through application of its balanced program, Tobey stated, ACI has brought better realization to its members, sold their coal competitively, maintained better than average running time at their mines and at the same time rendered a distinctive service to consumers and the public. He pointed out that ACI benefits its producers by correlating their many different coals and various price categories based on quality, use, market history and other factors. It provides reliable market information; it makes long-range market studies to aid producers who contemplate acquiring new coal reserves, opening new mines or purchasing existing mines.

ACI, he said, also provides basic information in connection with long-term contracts to protect the interests of consumer and producer. Other benefits to consumers include fuel studies for large industrial concerns in connection with plant site selection, while thousands of smaller consumers have been helped with combustion and fuel problems both directly and through distribution of booklets, manuals, technical and semi-technical papers.

Recognizing the importance of the retail coal dealer, it has worked in his behalf to promote the sale and better utilization of coal, and has engaged in smoke abatement work throughout the country. It has cooperated closely with railroads in joint market surveys, fuel studies to meet competition, etc.

"In carrying out its balanced program," Tobey concluded, "ACI has ac-

tually been living up to the promises its founders made to the United States Supreme Court in 1933."

C. C. Dickinson, chairman of the morning session, next introduced J. D. Francis, President of Powellton Coal Co., and said that it was his fertile mind that developed the idea for Appalachian Coals, Inc. Francis lauded the regional marketing concept and devoted some time to its legal status. He reviewed the almost unsurmountable difficulties that surrounded the



Walter J. Tuohy served as toastmaster at the luncheon session

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R. E. Salvati was toastmaster for the banquet meeting which wound up the celebration

beginning of ACI. The last part of his talk led naturally to the introduction of General William J. Donovan, the attorney who pled the cause of ACI before the Supreme Court in 1933.

General Donovan, famed as "Wild Bill" the leader of the "Fighting 69th" in World War I, titled his talk, "Full Legal Status—Yesterday, Today and Tomorrow." He outlined the problems facing the coal industry when ACI was organized and said that the regional marketing agency was—in the thinking of industry leaders of a generation ago—the alternative to government control and the difficulties of physical merger. He then went on to explain some of the principles enunciated in the Supreme Court decision of March 13, 1933.

Walter J. Tuohy, President of Chesapeake and Ohio Railway Co., served as toastmaster at the luncheon. He called on General Donovan for his second major address of the day, on the topic "The Struggle in Asia." Turning from lawyer to diplomat, Donovan drew on his broad acquaintance with the Far East to analyze the present situation there.

The afternoon session was devoted to a series of talks by ACI staff members and affiliated sales executives on the marketing agency's functions. Contractual obligations, pooling market data for better merchandising, the mechanics of regional marketing, and expanding markets through engineering, were among the topics discussed. Guests from coal-carrying railroads and from national mining and coal organizations also spoke briefly.

The anniversary celebration wound up with a banquet at which Raymond E. Salvati, President of Island Creek Coal Co., was toastmaster. Awards were presented to the founders and others who worked so hard during ACI's formative period. Dr. Jules Backman, professor of Economics at New York University, gave the principal address on "The Economic Outlook and Coal." He listed the favorable, neutral, and unfavorable influences that will affect the economy over the balance of the year.

P & R Closes Some Operations

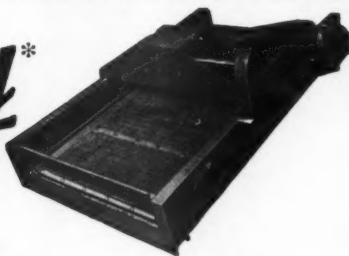
In a letter to shareholders of the Philadelphia & Reading Coal & Iron Co., Edward G. Fox, president, announced that the company has adopted a radically revised plan of operation. It provides for the suspension of all deep-mine operations, with the exception of the Pine Knot Mine which was responsible for about 14 percent of the company's 1954 deep-mine anthracite production. In accordance with the plan, Fox reported, the company has suspended operations of the Locust Summit Cen-

tral Breaker but will continue to produce coal at the St. Nicholas & Oak Hill Breakers. The plan provides for the production of approximately 3,000,000 tons of company coal and 1,250,000 tons produced by company associates in 1955.

At the present time four of the company's deep-mines are retained on a stand-by basis, pending decision as to their ultimate disposition.

The Philadelphia & Reading Coal & Iron Co. has its main offices in Philadelphia, Pa. It operates anthracite mines in northeastern Pennsylvania.

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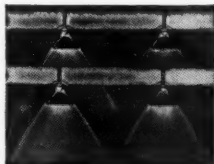
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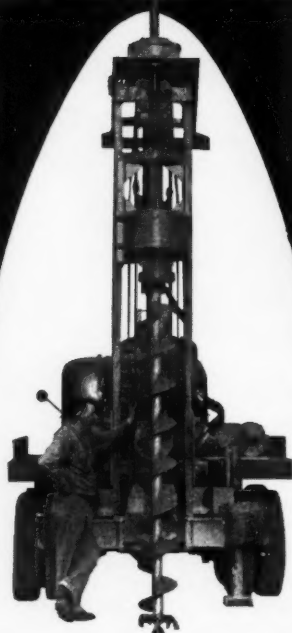
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R & P Reopens Coal Mines

The Rochester & Pittsburgh Coal Co. has resumed operation of coke ovens and coal mines at Lucerne-mines, Pa. About 35 men were called back to get the ovens started and 140 miners were scheduled for recall shortly after March 1.

Install Coal Planer

Early this year the Amherst Coal Co. completed installation of a German-made coal planer at the company's No. 4 Mine at Accoville, W. Va. At the present time the planer is being used on a one-shift per day basis, but mine officials report that operations will be expanded to two shifts per day as soon as enough men are trained.

Announce Safety Contest

It was recently announced that the 17th National First-Aid and Mine-Rescue Contest will be held at Knoxville, Tenn., Monday, October 10, through Wednesday, October 12.

A banquet and presentation of awards will take place on the final evening at the University's new University Center Building. Competitive events will be held at Chilhowee Park, where the Administration Building offers ample facilities for both first-aid and mine-rescue competition.

As usual, the contest is being sponsored by the U. S. Bureau of Mines in cooperation with the National Coal Association and other operators' associations, as well as the United Mine Workers of America, state mining departments, individual mining companies and mine equipment manufacturers, insurance underwriters and the University of Tennessee.

Atlas Again Gives Scholarships

Atlas Powder Co., Wilmington, Del., will award eight \$1000 college scholarships again this year, Ralph K. Gottshall, president, has announced.

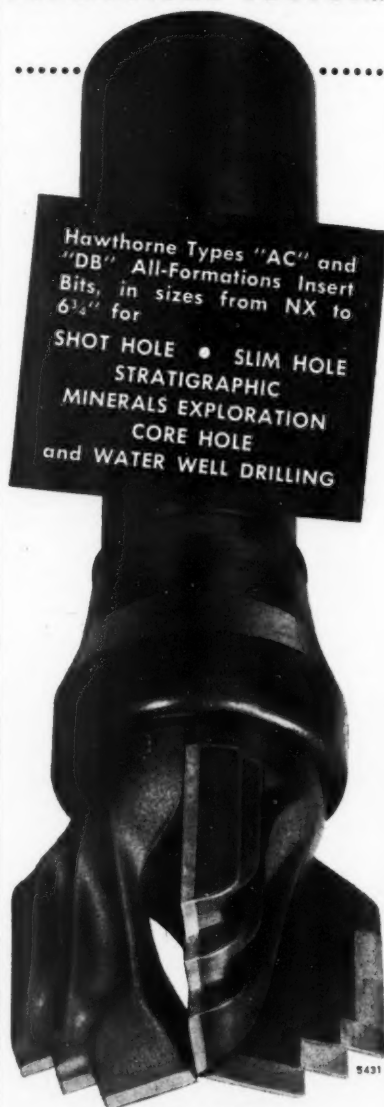
The grants will go to students who will be seniors during the 1955-56 college year, majoring in chemistry or any branch of engineering. Last year, the first year that the scholarships were offered, over 160 applicants were screened before the eight winners were selected.

Mr. Gottshall said that the awards are part of the company's program to enable outstanding students to complete their scientific education, in order to meet some of industry's pressing needs for technical personnel.

Scholarships will be awarded on the basis of scholastic records and the recommendations of faculty members who are acquainted with the applicants. Extra-curricular activities and financial need will also be factors.

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Open Valve at Osceola



Head Mine Captain O. Archambeault opens valve, as Foreman A. J. Bracco looks on

A 12-IN. VALVE, half a mile underground has now been opened, paving the way for completion of a seven-billion-gal unwatering project, one of the largest in mining history.

A turning point in the Osceola unwatering project of the Calumet Division, Calumet & Hecla, Inc., Calumet, Mich., the valve attracted national attention last fall when first civilian and then Navy divers attempted to find the valve and open it. This venture involved a 370-ft inclined descent into the pitch black mine waters and a try at walking 140 ft through the submerged workings to the valve.

When the divers failed, underground crews of the Calumet Division drove a 750-ft underground crosscut to provide a passage for the water. This job was completed in a record 25 work days, and pumping through the crosscut began January 22.

Over 200,000,000 gal had to be pumped to uncover the valve and a 12-in. pipeline. This point was reached February 28.

On the unwatered mine level, Cal-

umet Division officials were able to trace the route a Navy diver took in a final attempt to reach the valve. When time limitations forced him to turn back, he dropped a reel he was carrying. It marked his point of furthest advance—35 ft into the mine level. They also found two underwater flashlights, dropped while divers groped their way through the water.

With the valve open, pumping through the 12-in. pipeline was started March 3, using two small, auxiliary pumps. Pumping will continue in this way until a 450-hp submersible pump can be lowered from the pipeline level to the bottom of the shaft—1050 inclined feet—to finish this portion of the unwatering. It will then be necessary to unwater about 1400 inclined feet in an adjacent shaft.

Head Mining Captain Oscar Archambeault reports that the valve and pipeline are both in good condition, despite 15 years under water. He says that he had to apply "Only about 50 lb of pressure," with a wrench to open the valve.

Plan Zinc Company Merger

Details of a plan to amalgamate Illinois Zinc Co. with Canadian Javelin, Ltd., and Boon-Strachan Co., Ltd., were announced in late February by Morris Blumberg and John C. Doyle, chairman of the boards of the American and Canadian companies. Illinois Zinc is an 85-year old producer of strip and sheet zinc with mining interests in New Mexico and Arizona. The Canadian companies have extensive iron ore and titanium properties in Labrador, Quebec and Chile.

As outlined in the announcement, the amalgamation calls for acquisition of all assets of the Canadian companies by Illinois Zinc in exchange

for stock in the American company which will vest the dominating interest in the shareholders of Canadian Javelin. It is proposed that the company's name will become Illinois International Iron and Zinc Corp., with an enlarged board comprising 12 members, seven of whom will initially represent the new Canadian interests.

Canadian Javelin's best known asset is the Lake Wabush iron ore deposit in Labrador which was recently described by Premier Joseph Smallwood of Newfoundland as containing more high grade shipping ore than the total original reserves of the Mesabi Range.

Other Canadian Javelin assets include a titanium property in Quebec,

a foundry near Montreal, and producing mining companies in Chile.

The Boon-Strachan Co. has been established for many years in Montreal in the wholesale coal business, selling to Canadian railways and industrial concerns.

Illinois Zinc owns and operates in Chicago one of America's most modern zinc strip rolling mills; a sheet mill in Peru, Ill.; a 1250-ton zinc concentrating plant at Deming, N. M.; and fully equipped zinc mines in the same state. The company is also currently readying for production the Shannon Mine at Gleason, Ariz., from which production of high-grade lead, zinc and copper is anticipated.

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One—No. 3JCM-2BE Joy continuous miner, 250 volts D.C., U.S. Bureau of Mines permissible plate, approval No. 2-773, serial No. JM-247.

One—No. 4-WS-2 Joy skid mounted high pressure water spray unit, 250 volts D.C., permissible plate, serial No. WS-157.

Approximately \$14,000 worth new spare parts for above continuous miner.

One—No. 12BU-9E Joy loading machine, serial No. 3696, approval No. 595 with permissible plate, 250 volts D.C., with rear conveyor to load into mine cars or shuttle cars.

Approximately \$1,800 worth of new spare parts for above loading machine.

Also approximately \$2,400 worth new spare parts for model No. 6SCSE-2 Joy cable reel shuttle car.

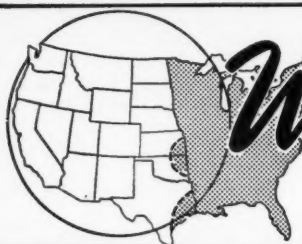
All of the equipment listed above is in excellent condition and some of it may be inspected in operation. We will sell at very attractive prices or will trade for No. 11BU Joy loaders, No. 512 Goodman shortwall mining machines, Universal cutting machines of any standard make, or possibly other equipment which you may have available for trading.

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Denver Mining Meet

ON February 3, 4 and 5, the Colorado Mining Association sponsored its 58th annual meeting in Denver. Chairman of the convention was Frank Coolbaugh, Climax Molybdenum Co., and Vice-Chairmen were Clyde V. Johnson, Denver Equipment Co., and Vernon J. Pick, Pick Uranium Co. Attendance set a new record for the meeting. Majority of those present were uranium miners. Taking part in the program were many U. S. Senators and Congressmen and leaders in the Atomic Energy field as well as operating men, financiers, educators and representatives of various government agencies.

Although the spotlight was on uranium, consideration was also given other branches of the industry, notably lead and zinc, gold, silver, molybdenum, tungsten, manganese and other metals, phosphate and fluorspar. The National Lead and Zinc committee met just prior to the Convention and at the Thursday afternoon session presented its report to the Convention.

A few of the subjects discussed at the various sessions and luncheon meetings were: "What Lies Ahead for the Mineral Industries in 1955" by George O. Argall, Jr., Editor, Mining World; "How A Metal Miner Can Handle Tomorrow's Technology" by R. H. Ramsey and A. W. Knoerr, Engineering and Mining Journal; "Future of the Uranium Industry" by E. B. Hotchkiss, Vitro Corporation of America; the workings of the Federal Securities Act; investment problems and opportunities in Atomic Energy. The lead-zinc situation was discussed by a panel including Senator Geo. W. Malone, Otto Herres, R. A. Young, R. L. Jones, B. F. Stapleton, Jr., E. P. Lupton, W. E. Burleson and Cecil Fitch, Jr. Another special session dealt with uranium mining and exploration in New Mexico. An Oil Shale section met on Thursday evening and there was a drilling symposium on Thursday morning. In the Legal Section on Friday, various considerations in staking of valid uranium claims held the spotlight while at the Tax panel on Saturday the tax problems of the uranium industry

held center stage. Wm. I. Powell of the American Mining Congress was one of those taking part in this panel. These are by no means all of the subjects covered. To catalog them all would take more space than is available here.

In summing up, at the end of the Saturday session, Jesse C. Johnson and Sheldon P. Wimpfen of the Division of Raw Materials, U. S. Atomic Energy Commission, restated the Commission's position on many of the topics covered during the conference. They expressed satisfaction with the broad scope of the meeting and thanked those concerned for bringing certain points up for attention.

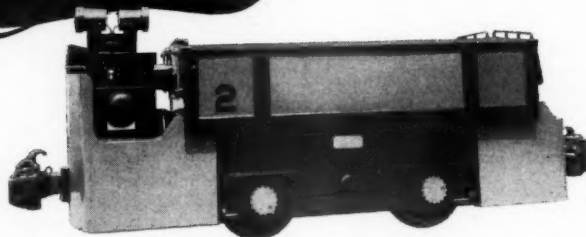
At the Uranium-Gold and Silver Banquet on Friday night, Jess Larson was toastmaster and Lewis L. Strauss, chairman of the Atomic Energy Commission, was principal speaker. Floyd B. Odum, president of the Atlas Corp., spoke on "Uranium and its Commercial Future."

The famed Sowbelly Dinner on Saturday night was dedicated to the late Pat McCarran, U. S. Senator from Nevada, and a life-long friend to mining. A record crowd turned out to do homage to the memory of Senator Pat. Senators Herman Welker of Idaho, George W. Malone and Alan Bible of Nevada joined in the spirit of the occasion with brief addresses.

After presentation of Safety Plaques to this year's winners, the evening's entertainment got underway with Art Linkletter as master of ceremonies. With the conclusion of the conference on Saturday night, officers of the Colorado Mining Association moved up one notch. Marvin Kay, who was elected president after the untimely passing of Harold S. Worcester, retired from that post. It was taken over by E. D. Dickerman of Denver. M. P. Cloonan of Cowdrey, Colo., is the new first vice-president; G. T. Rummel of Grand Junction, second vice-president; Max W. Bowen, Colorado Springs, is third



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vice-president; W. E. Burleson of Salida is fourth vice-president and D. W. Viles of Durango was elected fifth vice-president.

H. W. C. Prommel of Denver will continue as treasurer and Robert S. Palmer of Denver as executive vice-president.

Kennecott Copper Discovery

Nevada Mines Division, Kennecott Copper Corp., has announced the discovery of a new 1,000,000-ton copper ore body which runs 23½ lb of copper to the ton. Discovery was made in conjunction with the development of Deep Ruth underground mining project in White Pine County, Nev.

This discovery, named the "Minnesota Hi", has caused the division to change its plan for mining the Deep Ruth, according to J. C. Kinnear, Jr., division general manager, with production from the Deep Ruth to be delayed until after the newly discovered orebody has been recovered.

Alaskan Mercury Mine

The newly formed DeCoursey-Brewis Minerals, Ltd., is going ahead with rehabilitation work at a mercury property on the Kuskokwin River in Alaska as rapidly as possible. The mine is being dewatered and a new shaft will soon be started.

To Sink Shaft on Radon

A Hecla mining crew has started preparations sinking a three-compartment vertical shaft at the U and I Uranium Co.'s Radon property in San Juan County, Utah. Actual sinking operations are expected to be under way by the end of April, according to Ralph Neyman, general manager of Hecla.

Preliminary work will include construction of a half mile of road, leveling of the site for the shaft and surface plant, and erection of buildings to house the hoist, compressor,

Miners to Meet in Las Vegas

PLANS are well under way for the American Mining Congress 1955 Mining Convention—Metals and Industrial Minerals—in Las Vegas, Nev., October 10-13. Roy A. Hardy of Getchell Mine, Inc., chairman of AMC's Western Division and Hewitt S. West, president, Manganese, Inc., are co-chairmen of the General Committee and Louis D. Gordon, executive secretary, Nevada Mining Association, is vice-chairman.

Joseph Wells, president, Wells Cargo, Inc., will head up the Publicity Committee and Fred A. McGonigle, vice-president and general manager, Manganese, Inc., will serve as chairman of the Trips Committee. Co-chairmen of the Ladies Committee are Mrs. Hewitt S. West and Mrs. Joseph Wells.

For those whose responsibility it is to produce the metals and industrial minerals that are so vital both to our civilian economy and to the national defense, attendance at this most important mining meeting of the year is a prime requisite. By fall many economic and legislative problems confronting the industry will have crystallized. Those attending the Convention will be in position to formulate a Declaration of Policy setting forth the considered views of mining on national issues. Many prominent legislators and leaders in Government will be on hand to join in the discussions of these matters.

At the operating sessions the practical problems of how to mine and process ores and minerals will be thoroughly examined and solutions

suggested. Leading operating men will relate their experience in the finding, mining and treatment of mineral deposits safely and economically. The free exchange of information that takes place at these sessions is a powerful contributing factor to continuing progress in the mining industry.

Interest is running high in this

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LAS VEGAS—OCTOBER 9-13

meeting in Las Vegas, the "fun capital" of the West. Requests for reservations should be sent in as soon as possible to the Las Vegas Housing Committee, Las Vegas Resort Hotels Association, P.O. Box 1750, Las Vegas, Nev. Those who prefer motel accommodations should write to Frank Ellis, Sr., president, Las Vegas Motel Association, c/o Par-A-Dice Inn, 22217 Fremont St., Las Vegas, Nev.

and shafts. According to Neyman, the shaft work will be on a three-shift basis, six days a week and progress is expected to be about 200 ft a month. At this rate the 600-ft depth objective will be reached before the first of August.

Under the terms of the Hecla and

U and I profit-sharing agreement, Hecla will finance all costs of the Utah development and will be reimbursed out of first profits from production, after payment of a 15-percent royalty. Diamond drilling has outlined a considerable uranium orebody on the Radon claims.

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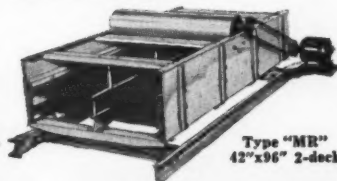
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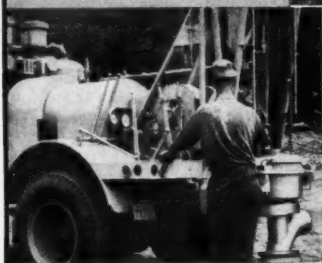


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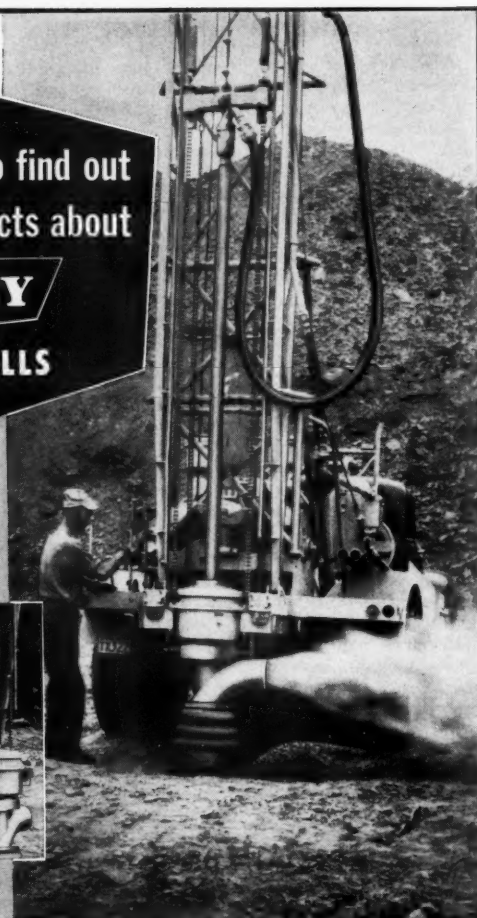
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Montana Tungsten Mill

Minerals Engineering Co. has placed in operation a second 400-ton milling unit at its Glen, Mont., tungsten concentrator. R. N. Robie, mine superintendent has announced. Open-pit mining operations will be stepped up to about 20,000 tons monthly.

Ship to Bishop

Tungsten concentrates are now being shipped to the Vanadian Corp. plant near Bishop, Calif., from a new mill in operation 25 miles east of Fallon, Nev.

Construction of the mill began last summer. Owners are John Olson of Los Angeles and Fred Bennett, Hollywood, Calif., who have purchased a scheelite property in the area. Scheelite ore from their mine is being processed by the new mill.

Shuttle Car Haulage

(Continued from page 86)

other purposes. However, they cannot pull through very wet bottoms as well as cable cars and the heavy batteries affect the size of the load they can carry.

The universal cutting machine has proven to be a useful tool in conjunction with shuttle-car haulage. With it, sumps can be quickly cut into ribs, beneath the pillars out of the way of shuttle-car haulage. By means of small portable pumps most areas can be kept fairly dry. The machine is also invaluable to clear overhanging brows and top coal which obstructs shuttle car travelways.

Several surfacing materials have been tried on shuttle car roads, but large pieces of coal, thrown into the ruts, make about as good a base and surfacing material as can be found. When rutting becomes so great that coal will not suffice, corduroying with two-in. timber is an alternative.

Back lashing of the cables to extend the haulage distance is possible but is seldom practiced. The cable is hard to reel in against the resistance of the rollers, when back lashed, and is frequently run over and many blown out cables result where this is the practice.

Conclusion

These do not represent all of the phases or factors represented in shuttle car haulage. Illustrations used and the examples given are representative, to the best of the author's knowledge, of the major problems encountered when using shuttle cars. Lack of space prohibits any more specific and detailed discussion and the subject is too broad for anything but a general accounting.

Texas Uranium

It has been reported that a major uranium strike has been made in Karnes County, Texas. The strike was made approximately 12 miles west of Falls City, Texas, and has resulted in the leasing of uranium rights for most of the land in that area. Extensive ore drilling has been undertaken in the vicinity of the strike.

Diesel Equipment

(Continued from page 96)

This truck has been in constant service for about a year. Owing to preventive maintenance, no major repair has been required to date.

The most recent piece of equipment to go into service in a rapidly growing fleet of Diesel Units is a Maintenance Service Truck. This unit is a $\frac{3}{4}$ -ton Jeep chassis equipped with a Waukesha 180 DLC engine. A power takeoff is used to operate a small winch. This truck has been operating approximately four months and is completely satisfactory within its limits.

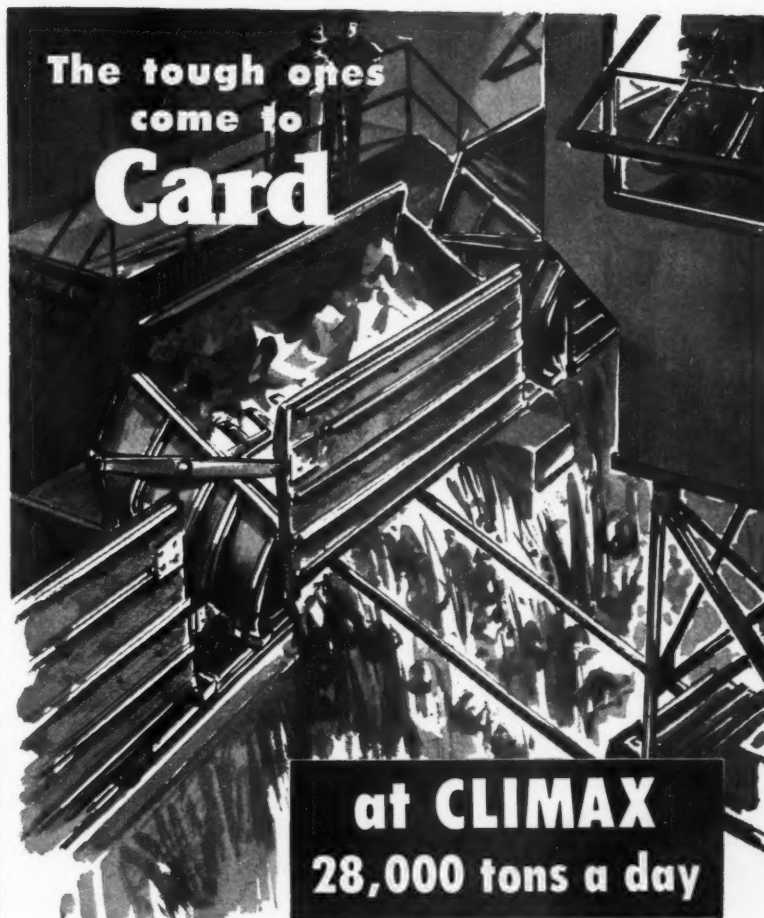
It might be well to point out that experience has shown that in a mine where grades are encountered, or in which loose material exists, a four-wheel drive transmission is almost a must to obtain full tractive effort.

Diesel Roof Bolt Machine

A new Roof-Bolting Machine has just been received. This unit has not been placed in service to date. A two-cylinder 71-series General Motors Diesel is used for the prime mover, and is directly connected to a triple tandem hydraulic pump. All motions of the drill, including tramming, are hydraulically powered. No difficulty is anticipated with this machine, since the engine must operate at a high rpm and most trouble is found at the lower or idling speeds.

It is the final conclusion that Diesel equipment has a definite place in underground mining. Although its usage is still in its inception, its future lies ahead. As more equipment is put in service, better methods of maintaining it will be developed. Manufacturers are becoming increasingly interested in this new market, and improvements are sure to appear.

The State and Federal Bureaus of Mines are following with interest the increasing use of Diesel engines. Each new unit must be inspected by the State before going into service. The Federal Bureau has run complete tests on all types of equipment under actual operating conditions. They are compiling information so as to be in a position to make recommendation as the usages increase.



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Wheels of Government

(Continued from page 107)

quirements as applied to domestic suppliers; and would ban sales of natural gas at a price below cost, including cost of transportation and sale, plus a fair proportion of the fixed charges.

The coal industry is throwing its weight behind the Staggers measure, declaring that it will have the effect of strengthening the domestic fuel economy, contribute to the conservation of natural gas, and increase the defense potential of the nation. The industry will also point out that this measure will be of real benefit to home consumers of natural gas.

Domestic coal producers will also testify that the Harris bill ignores the recommendations of the Cabinet Committee on Energy Supplies and Resources Policy; fails to terminate the practice of charging home consumers of gas all the traffic will bear while dumping gas from the same pipeline at below-cost-of-production prices under industrial boilers; and is exclusively in behalf of gas producers, pipelines and large consumers when the situation calls for a Congressional investigation of the entire problem of distribution and sale of natural gas in interstate commerce.

Representatives of the coal industry have met with interested labor groups, consumers and others interested in the welfare of the industry in an effort to increase support for the Staggers measure.

Renegotiation Act

The Renegotiation Act of 1951, as amended, would be extended until the end of 1956 if Congress approves a request of the President. In a recent message Mr. Eisenhower said that continuation of the Act is necessary in order to protect the Government against unreasonable prices in contracting for defense items. He urged renewal of the Act from the date of its expiration—December 31, 1954—stating that the entire period of defense expansion which the country has undertaken since the beginning of the Korean war should be considered as a whole insofar as renegotiation treatment is concerned.

Since the President called for extension of the Act in its present form it is expected that any measure approved will continue the present exemption for mineral raw materials.

Multiple Mineral Development

The Interior Department has issued proposed regulations for administer-

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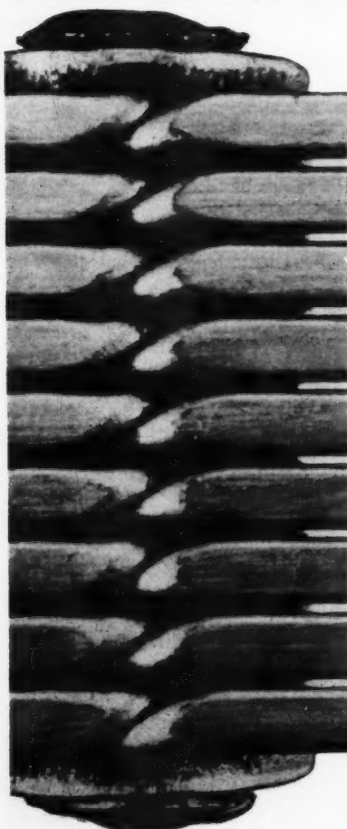
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ing the Multiple Mineral Development Act which passed Congress last year. The measure resolves the conflicts between the mining and mineral leasing laws, permitting the location of mining claims on public lands previously closed to such location because of their potential production of oil and gas or other minerals under the Mineral Leasing Act. The regulations will go into effect in April and copies may be obtained from the Bureau of Land Management, Interior Department, Washington 25, D. C.

Meanwhile the House has passed and sent to the Senate a measure sponsored by Rep. Clair Engle (Dem., Calif.) which would open public lands withdrawn for power sites to location under the mining laws. Similar measures have been approved by the House in past sessions of Congress but have not reached the Senate floor for a vote.



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New Mill in Smoky Valley

A new mill to process tungsten from the Linka Mine, in Smoky Valley near Austin, Nev., went into operation early in February.

The mill will operate at reduced tonnage for several months until its men have been fully trained, according to M. N. Shaw, manager at Linka for Consolidated Uranium Mines of America. Full capacity will be reached late this spring.

Mining at Linka resumed last fall. Shaw reports that the tungsten ore body there "has exceeded all expectations both in size and in grade." Plans are being made to sink a shaft to the 300-ft level. Present shaft reaches 150 ft.

Washington Clay Mine

Spokane Portland Cement Co. has requested the Spokane County Planning Commission to permit clay mining operations on 40 acres of land southeast of Shelley's Lake in the Spokane Valley. G. M. Bell, president of the company, which operates a large plant at Irvin said the clay would replace shale rock now mined at Boyds, Wash., near the Canadian border. The petition filed by the company said the proposed clay operation would provide approximately 20 percent of the materials used at the Irvin plant.

Restore Hoover's Home

The boyhood home of Herbert Hoover in the small Quaker town of Newberg, Ore., has been purchased and is now in the process of being restored and refurnished by a group of former fellow townsmen and friends organized as the Herbert Hoover Foundation and headed up by Dr. Burt Brown Barker, vice-president of the University of Oregon. The town of Newberg, has named its park for him and the Oregon Highway Commission has named the highway from Portland to Newberg, the Herbert Hoover Highway. Mr. Hoover has been invited by the Oregon Legislature to attend the opening of this house on his eighty-first birthday, August 10, 1955.

Born in West Branch, Iowa, Herbert Hoover lost his father at the age of six, his mother when he was only eight and lived until he was ten years old with his uncles, one in Oklahoma, and another near West Branch. A brother of his mother, Dr. H. J. Minthorn, who was principal of the Friends Academy of Newberg, arranged for young Hoover to come and live with him.

Herbert Hoover spent his youthful days here and it is the purpose of the Foundation to restore the house

and its furnishings to their original condition, so far as possible. They have been fortunate in being able to accomplish this to a considerable degree with furniture that was actually in the house and photographs, portraits and documents dating back to that time.

The Foundation's work has been handicapped by greatly limited funds. It has been supported entirely by voluntary contributions and no general campaign has been made. Outside of the immediate neighborhood

and a circle of friends, comparatively few people know about the movement. To those who respect and admire this great American this offers an opportunity to express individual appreciation. Any contributions for the restoration and maintenance of Herbert Hoover's boyhood home will be welcomed by the Foundation and put to good use. Checks should be made out to the Herbert Hoover Foundation and addressed to Doctor Burt Brown Barker, 3438 S.W. Brentwood Drive, Portland, Ore.



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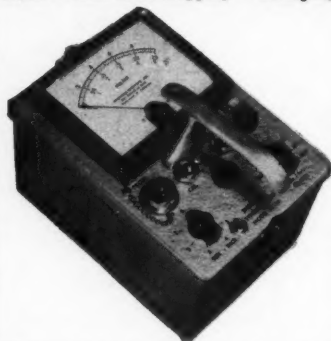
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Arizona Land Restoration

Restoration of 123,540 acres of Arizona land to the Public Domain has been ordered by the Secretary of the Interior, Douglas McKay.

The lands, originally withdrawn and no longer needed for reclamation purposes, are situated in the Colorado River Valley along the east side of the river and south from Bullhead City and to the Imperial Dam. The restored lands became subject to public entry February 3, 1955.

Marysval Alunite Deposits

The Calunite Corp. and the Rocky Mountain Mining & Development Co. are now shipping alunite ores, containing phosphate and sulphur from the Marysval mining district of Utah for use as fertilizer. Tests have revealed that the ore is a constant growth factor in plants.

Calunite completed a \$250,000 processing plant at Marysval in 1954 and Rocky Mountain is now considering the construction of a mill to manufacture fertilizer in Utah.

Rare Mineral Discovered

Discovery of a deposit of dumortierite, a comparatively rare aluminum silicate mineral in Montana has been announced by the Department of Interior. The discovery was made about seven miles north of Basin, in Jefferson County, by the U. S. Geological Survey in the course of geologic mapping for the Atomic Energy Commission.

Open Riverton U-Ore Station

On March 1 the U. S. Atomic Energy Commission opened a new ore-buying station and sampling plant at Riverton, Wyo. The plant is being operated by the American Smelting & Refining Co.

Establishment of the Riverton ore-buying station will provide a market for uranium-bearing ores of the Gas Hills area and surrounding region.

To Increase Polish Output

Work is now under way at the Carlsbad, N. M., plant of International Minerals & Chemical Corp. to increase production of potassium sulphate approximately 100 tpd.

Major items of new equipment to be added include one Raymond mill, a new boiler, a new crystalizer and an additional centrifuge. In addition, two of the present reaction tanks will be replaced by larger ones and the present dryer will be replaced by a new and larger unit to handle the increased production.

Engineering and construction work on the project is being done by the Stearns-Roger Mfg. Co.

Correction

An error of fact in the annual review article on fluorspar (February 1955, page 105) has been called to our attention.

The fluorspar flotation plant at North Gate, Colo., was built and financed by the Ozark Mahoning Co. entirely on its own. The plant's output is sold to the Government at a guaranteed price of \$60 per ton and not at \$65, as reported.

Lease Ruby Mt. Property

A rare metals deposit 65 miles south of Wells, Nev., has been leased to U. S. Uranium of Salt Lake City by Errington and Thiel of Elko, Nev., in a \$500,000 transaction. This Ruby Mountain property has already produced commercial grade ore.

Alaskan Mine Reopening

The Danzenger Lead-Silver Prospect Bonfield District of Alaska, is being reopened by the Gilmore Lode Mining Co. of Fairbanks. Last fall the company took in a tractor, compressor and tools and built a landing strip at the property. The old workings are now being reopened.

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No Accidents Last Year

During 1954 the Oro Grande, Calif., plant of the Riverside Cement Co. operated without a lost-time accident. Only one lost-time accident occurred at the Crestmore, Calif., plant of the company.

The safety committees, the mill management, the unions and the individual employees are to be congratulated in their determined drive to prevent accidents and to maintain the company's outstanding safety record.

Plan Brass Mill

American Brass Co. will soon begin construction of a new brass mill in Los Angeles, according to John A. Coe, Jr., president of the firm.

The new mill with annual capacity of 30,000,000 lbs will be built for the production of copper and copper-base alloys in the form of sheet, strip, rod, tubing and drawn copper products and will involve an expenditure of \$13,000,000.

Announcement of this plant location follows earlier announcements by American Brass of plans for the construction of an aluminum fabri-

cating plant at Terre Haute, Ind. and a production facility for flexible hose and tubing at Mattoon, Ill. The projects will be completed during 1955.

Join Hands to Mine Potash

Kerr-McGee Oil Industries, Inc., and the National Farmers Union have entered into an agreement for the development of potash deposits in southwestern New Mexico. The two firms have announced plans for the formation of a jointly-owned corporation to mine, process and distribute the potash on a nation wide basis. Farmers Union owns leases on 13,000 acres of land in Eddy and Lea Counties. Kerr-McGee has started a pilot plant operation on the property near Artesia, N. M., as first stage in the development of the program.

Thorium Plant in Colo.

E. W. Ohlson, Jr., partner in the American Mineral Development Corp., has announced that his firm plans to construct a thorium refining plant at Carson City, Colo. The corporation holds leases on 1320 acres of mineral lands in the Oak Creek district about 17 miles south of there.



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Acquires Arrowhead Mines

Rare Metals Corp. of America, owned jointly by El Paso Natural Gas Co. and Western Natural Gas Co., has acquired the capital stock of Arrowhead Uranium Co., including properties in the vicinity of Cameron, Ariz.

Arrowhead has been producing uranium ores on part of its properties on the western side of its Navajo Indian Reservation for the past two years. Rare Metals is planning an extensive exploration program and has made application for the erection of a processing mill to the Atomic Energy Commission.

International Expands

International Minerals & Chemical Corp. has purchased all of the assets of U. S. Mining Co. and Peerless Perlite Co., according to an announcement by Louis Ware, president. Both of these companies are in Los Angeles, Calif., and the assets include very large reserves of high quality perlite ore in Inyo County, Calif., a drying and grinding plant near Big Pine, Calif., and a perlite expanding plant in Los Angeles.

The properties will be operated by the Industrial Minerals Division of International Minerals & Chemical

Corp., under the supervision of Norman J. Dunbeck, vice-president. The perlite industry has enjoyed a spectacular growth which is expected to continue, and International's entry into this field is a further step in the corporation's diversification, according to Dunbeck.

Star Mine Pumping Station

Pumping facilities at the Sullivan Mining Co.'s Star Mine, Wallace, Idaho, are being expanded to handle water from adjoining working of the Morning Mine, which was closed late in 1953. A new main pumping station, believed to be the district's largest, has been placed into operation on the 4000-ft level. Two 750-hp units, each capable of boosting 1000 gpm up to the 2030-ft adit level, will be used alternately. On the 5300-ft level, a drainage tunnel is being driven to connect with old Morning workings.

To Develop Uranium Claims

Utah Construction Co. has entered into a \$500,000 uranium operation agreement with Comstock Oil & Uranium Co. of Salt Lake City and Santa Cruz Uranium Co. of Nogales, Ariz. S. A. Walsh, president of Comstock, announced that Utah Construction would contribute \$250,000 to de-

velopment of uranium ore claims between Tucson and Nogales and that Comstock and Santa Cruz will each contribute \$125,000.

Their first uranium mining venture, Utah Construction will operate the properties, which include 20 unpatented claims in the Tyndall Mining District of Arizona, under a joint agreement.

Low Accident Rate

One of the outstanding safety records of the United States has been compiled at the Frederick coal mine of the Colorado Fuel & Iron Corp., at Valdez, Colo. Only six lost-time accidents were reported during 1954, according to superintendent Frank C. Bennett. This was half the number of lost-time accidents in 1953.

Frederick has operated more than 3,000,000 man-hours since the last fatality at the mine, which occurred in February 1951—the national average for coal mines is about one million man-hours per fatality. Fifty-two men at Frederick have worked 30 years or more without a loss-time accident and 67 men have perfect safety records for more than 20 years, making a total of 119 employees who have accident free records of more than 20 years. Approximately 600 men are employed at the mine.

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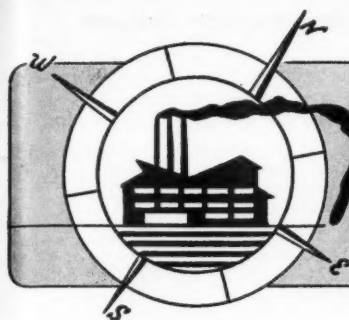
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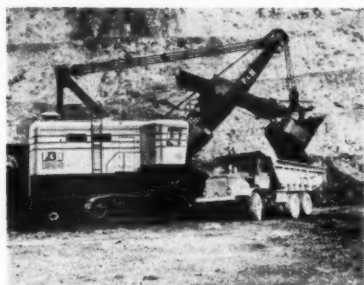


Manufacturers Forum

Announce New Shovel

Details have been released by Harnischfeger Corp. on its newest and largest electric shovel. Designated the P&H Model 1800, this mining shovel has an eight-cu yd capacity.

Model 1800 innovations include P&H electronic control for all operating functions, centralized a-c motor



drive, widespread boom foot with rubber shock absorbers and externally mounted propel brake.

The machine has a boom length of 39 ft with 24-ft dipper sticks. It stands 40 ft high and weighs 525,000 lb.

Details on the new machine may be obtained from the Harnischfeger Corp., Electric Shovel Division, 4617 W. National Ave., Milwaukee 46, Wis.

Stronger Rope

A new high strength wire rope has been announced by the wire rope division of American Chain & Cable Co., Wilkes-Barre, Pa. The company reports that an average tensile strength of 300,000 psi has been achieved by the use of special precise analysis high carbon steel wire and improved processing. The preformed rope, to be known as VHS, will be marketed by both the Hazard Wire Rope and the American Cable Divisions. Present diameters of the new product range from 1/2 to 2 in.

Improved Belt Drive

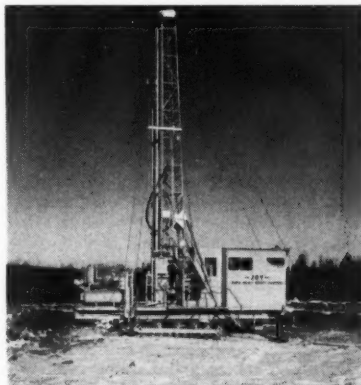
The American Pulley Co. announces a new Single-Groove Wide-Range Adjustable-Speed Drive available in "Q," "R" and "W" belt sections. The company reports that recent develop-

ments have increased capacities of this type of drive to the point that it will safely transmit up to a maximum of 30 hp. The drive permits a speed variation of as much as 100 percent at horsepower capacities comparable to former drives having two or three belts.

Complete engineering catalog on this line is available from The American Pulley Co., 4200 Wissahickon Ave., Philadelphia 29, Pa.

Bigger Drill

Joy Mfg. Co., Pittsburgh, Pa., has announced a new larger model in its Champion line of blasthole drills. The new model is the Super Heavyweight Champion (Model 60-BH), a rotary-air blast drill designed for 9 to 12-in. holes in any rock formation. The drill cuts the rock with a roller-cone type bit while a blast of compressed air continuously removes cuttings from the hole. Extra features of the Super Heavyweight, according to the manufacturer, are a rod handling device and power air swivel, which eliminate the need for climbing the derrick; a variable speed motor operating through a five-speed transmission to

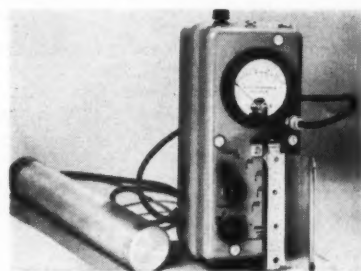


give sufficient torque at any desired bit speed and any desired tramping or hoisting speed; and fully automatic hydraulic chuck.

Bit pressure is rated by the manufacturer at 60,000 lb. Complete information on this new drill can be found in the manufacturer's Bulletin D-39.

Scintillation Counter

The Radiac Co., Inc., 489 Fifth Ave., New York 17, N. Y., announces the Super Fission Finder, a scintillation counter specifically designed for locating uranium ore. It is equally suited for aerial and motor-vehicle surveys, for prospecting on foot, and



for radioactivity logging of drill holes.

A continuous strip chart pen recorder can be plugged directly into the phone jack for a permanent record of the radioactivity pattern of the area traversed in aerial or mobile surveys, and for a permanent log or graph of the gamma activity in drill holes.

For logging drill holes, a screw-on probe attachment with 200 ft of cable is supplied. The probe contains a built-in preamplifier to maintain signal strength throughout the cable. No external preamplifier is needed for subsurface exploration.

Timken to Build Rock Bit Plant

The Timken Roller Bearing Co. has announced plans to construct a rock bit producing facility at its St. Thomas, Ontario plant. Steel for the necessary building addition will be ordered immediately, with construction scheduled to get under way in six or eight weeks. It is estimated that rock bit production will get started around September 1955. The new building addition will contain 5600 sq ft of floor space. Cost of the building and equipment is estimated at about \$250,000.

Carbide insert rock bits will be produced at the St. Thomas plant in sizes up to three in. in diameter for the expanding Canadian markets and export trade.

Head Protection

Welsh Mfg. Co., 9 Magnolia St., Providence, R. I., has introduced a



new safety hat. Called the Welsh-Guard Plastiglass Safety Hat, it has the strength to withstand an impact of up to 40 ft lb. The manufacturers say that the resilient material is moisture proof and will not crack or break. The hat is available in brown; other colors on special request. Two styles are offered, one with a broad rim around the entire hat and another with the brim only in front. Web chin strap, winter liners and extra leatherette cradles are available from the company.

Portable Core Drill

A lightweight, portable core-drilling machine with detachable bits for use by miners and prospectors has been developed by Demo Tool Corp., Los Angeles. The machine is said to be easily transported into remote areas.

Unique features of the Demo include a buttress-shouldered thread



that removes cuttings with a minimum of lubricant, and a water and air swivel that distributes lubricants through the entire length of the core tubes. Air is used as lubricant when drilling short holes; water on deeper holes. For more information write Demo Tool Corp., 8735 Melrose Ave., Los Angeles, Calif.

Heavy Duty Log Washer

A new king-size log washer has been introduced by Eagle Iron Works, 274 Holcomb Avenue, Des Moines, Iowa. Diameter of the log—the shaft and paddles—is 48 in. Tub weight is 9 ft 4 in. and tub length is 30 ft. While capacity depends largely on size of material to be washed and amount of foreign matter to be removed, the unit is rated at 150 tph. Unit is powered by 150-hp electric motor through an enclosed reduction unit.

Paddles have replaceable shoes of Ni-Hard, nickel-chromium-iron alloy. Unit can handle material up to eight in. in diameter.

Solids Pumping

Western Machinery Co. has applied the torque converter principle to a solids pump it recently introduced. It is called the Wemco Torque-Flow Solids Pump. A centrifugal type pump, the impeller is located out of the main flow and offers unobstructed passage to any liquid-solids combination that will pass through the piping.

In operation, the impeller sets up a vortex, causing material in the main pump body to rotate, thus developing suction and pressure heads necessary for pumping. The vortex extends into the feed line and draws particles into the moving stream—not unlike the waterspout of a hurricane. Particles swirl into the fast moving vortex within the pump housing and are discharged without having touched the impeller. The company reports that it has handled lead-zinc ore from a wet grinding operation containing as high as 80 percent solids.

For complete information on the new pump, write Western Machinery Co., 760 Folsom St., San Francisco 7, Calif.

Disc-Type Magnetic Recorder

Commercial production of the first seismic magnetic recorder to use a disc as the recording medium has been announced by Houston Technical Laboratories.

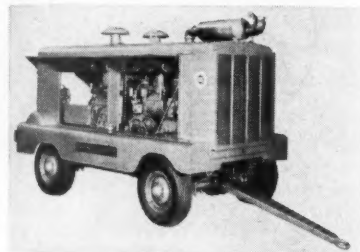
Trade-named "MagneDisc," the new HTL system is a convenient method for recording an unprecedented amount of seismic information. Use of the magnetic disc makes possible the recording of up to 96 data channels on one plastic disc.

"MagneDisc" is said to be particularly useful in any area where a number of shots, using different filter combinations, are normally required to obtain an optimum record. In such an area it makes unnecessary several conventional shots by means of broad band recording with subsequent playback using the necessary filters to get the optimum record.

For Bulletin No. S-307, write to Houston Technical Laboratories, 2424 Branard, Houston 6, Tex.

Water-Cooled Rotary Compressor

An all-new rotary portable air compressor has been announced by Gardner-Denver Co., of Quincy, Ill. The compressor has a capacity of 600 cfm,



and has been named the Gardner-Denver Rotary 600.

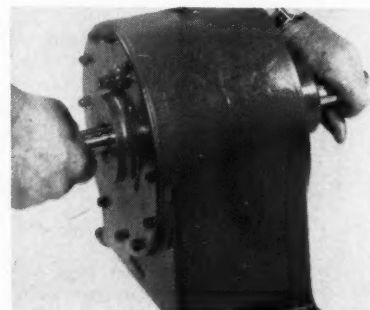
The new water-cooled rotary compressor is reported to provide reliable operation under severe weather conditions ranging from 40° F below zero to 115° F above.

The compressor is powered by a General Motors diesel engine, Model #6-71, with normal operating speed of 1800 rpm an electric starting system furnished for the engine. Further specifications are available from the manufacturer.

Torque Converter for Small Motors

Fluomatic, a fluid torque multiplier for gasoline or electric motors under 10 hp, has been announced by the manufacturer, Little Beaver Industries, Willoughby, Ohio.

According to Lowe, White & Co., the development engineers, Fluomatic



eliminates shock starting or stopping and gives full, easy power take-offs on intermittent or power loading.

The manufacturer states results have been excellent on screw conveyors, winches, hoisting devices and numerous other machines.

Three Models Added to Pump Line

Dorr-Oliver Inc., Barry Place, Stamford, Conn., announces the availability of three additional sizes of the Oliver Type L Centrifugal Pump. The complete range now includes 1, 1½, and 1½-in. models in addition to the 2-in. unit, first of the series to be developed.

In the three larger sizes of Type L

Pumps all parts in contact with liquid are made of either stainless steel, bronze, or cast iron. Impellers of three different diameters can be supplied and the pumps may be either direct-connected or V-belt driven.

At present, the 1-in. model is available only in stainless steel and with one diameter impeller. It is direct connected with an integral motor mounting and a mechanical shaft seal with a ceramic against carbon sealing face is employed.

The manufacturer claims that the major advantage of the Type L Pump is the high cut-water or "tongue" of the volute which makes the unit self-venting and minimizes formation of air pockets, permitting easy priming and better maintenance of prime during operation.

New Rail Clamp

A new lightweight rail clamp that can carry 400 amps continuously without overheating is announced by Ohio Brass Co. Weighing only slightly more than a pound, the clamp may be attached to the base of any size rail

up to 100 lb and it will accommodate cable sizes from No. 14 to 2/0.

The clamp is held securely on the rail by a cup-pointed set screw which bites through scale and rust to provide positive electrical contact. A swivel action handle is permanently attached to the head of the set screw.



Because of its compactness when installed on the rail, the clamp does not interfere with passage of car wheels.

Clamp body is made of malleable iron, clamp-type cable connection and handle are of aluminum bronze.

For further information write Ohio Brass Co., Mansfield, Ohio.

Announcements

The appointment of W. H. Parkinson as advertising, publicity, and sales promotion manager of Quaker Rubber Corp. has been announced. He succeeds W. M. Taylor, who was promoted to the staff of Quaker's parent company, H. K. Porter Co., Inc., at Pittsburgh, Pa.

Flood City Brass & Electric Co., Johnstown, Pa., announces the appointment of L. A. Grasso to the newly-created position of sales manager. Grasso will direct the company's sales activities in the coal mining, industrial, and contracting fields in Western Pennsylvania and Northern West Virginia.

Richard H. Koehler has been appointed director of advertising for publicity for Westinghouse Air Brake Co. He moves up from the post of advertising and sales promotion manager at the company's Le Roi Division in Milwaukee, Wis. He succeeds Joe H. Serkowich who recently resigned to accept a position with a Chicago advertising agency.

Cardox Corp., Mining Division announces the appointment of Joseph C. Hume as assistant district manager for southern West Virginia with headquarters in Logan, W. Va.

Food Machinery and Chemical Corp. has entered into an agreement with the Chiksan Co. whereby it will offer to exchange one share of Food Machinery and Chemical Corp. common stock for 2.30 shares of Chiksan Co.

common stock of which there are 260,264 shares outstanding.

This announcement was made jointly by Ben C. Carter, FMC executive vice-president in charge of machinery divisions, and H. J. Hagn, president of Chiksan.

The new operation will function under its present management as the Chiksan Division of FMC.

Building of new plant facilities which will accommodate a major expansion in its line of Swedish manufactured pneumatic mining, construction, and industrial equipment is under way at Copco Pacific Ltd., San Carlos, Calif., according to general manager Charles E. Burton.

The two unit project will double the company's warehouse space and also provide additional offices. The \$30,000 program is expected to be completed by April 1.

Precision Radiation Instruments, Inc., recently announced that the company's general offices have been moved to 4223 W. Jefferson Blvd., Los Angeles. The general offices were formerly at 2235 S. La Brea Ave. This location has been retained as the company's sales office.

Kennametal Inc., Mining Tool Division, Bedford, Pa., announces the additional appointments of Pennsylvania and West Virginia Supply Corp., Wheeling, W. Va., and Central Supply Co. of Virginia, Inc., Andover, Va. as distributors of Kennametal Mining Tools.

CATALOGS AND BULLETINS

AIR AND ELECTRICAL SCRAPER HOISTS. *Ingersoll-Rand Co., 11 Broadway, New York 4, N. Y.* A full line of air and electric hoists for handling bulk materials of all types is described. Single, double and triple construction hoists as well as drum lengths, frame construction and motor types are discussed and shown in line drawings. Tables covering weights of materials and rope pull required for drawing cars up grades or inclined tracks are included as are full descriptions of two types of remote control units, throttle equipment and several types of brakes. Ask for Form 5300-A.

CENTRIFUGAL PUMPS. *Aurora Pump Div., New York Air Brake Co., 629 Loucks St., Aurora, Ill.* Bulletin 105-B describes Aurora's Type O horizontal split case, double suction centrifugal pumps. Recommended for handling circulating and wash water, chemical solutions and oils, these pumps are supplied in capacities to 4600 gpm against heads of up to 225 ft. Construction details are described and suggested specifications are included. There is also a dimension chart and a selection table showing range of output and heads.

DENVER LABORATORY EQUIPMENT. *Denver Equipment Co., Denver, Colo.* Catalog No. LG 3-B10 describes the company's complete line of equipment for assaying and batch or continuous test points employing flotation, cyanidation or gravity concentration. Well illustrated and in great detail, the catalog contains among other things concise table of minerals and their characteristics.

HOW TO OPERATE A LIFT TRUCK. *Hyster Co., 2902 N. E. Clackamas St., Portland 8, Ore.* The sixth printing of this popular booklet is now available free to lift truck operators, supervisors, safety engineers and other interested personnel. Prepared for use as part of an operating program, the booklet is slanted to both the beginner and the experienced operator. It can be studied individually by the operator or used as a guide by instructors. Ask for Form 1214.

MINING ON THE MOVE. *Advertising Dept., LeTourneau-Westinghouse Co., Peoria, Ill.* This is a 14-minute sound-and-color movie picturing and describing modern haulage and materials-handling methods used in a wide variety of mining applications. The film is available without charge to engineering groups, school classes and other organizations interested in mining.

POWER FOR PROGRESS. *Detroit Diesel Engine Div., General Motors Corp., Detroit 28, Mich.* A new brochure describing the operation of General Motors "6-110" diesel engines and illustrating industrial and marine models in the series from 200 to 575 hp. The brochure covers features of design, specifications and power curves of single, multiple-engine and torque converter units and includes photos of these engines at work in various types of equipment.

POWER TRANSMISSION. *The American Pulley Co., 4200 Wissahickon Ave., Philadelphia 29, Pa.* The company announces four new catalogs covering its line of Wedgbelt (V-belt) drives, speed-reduction drives, flat-belt drives, and steel conveyor pulleys. Each is fully illustrated and contains selection and dimensional information as well as engineering data. Copies are available upon request.


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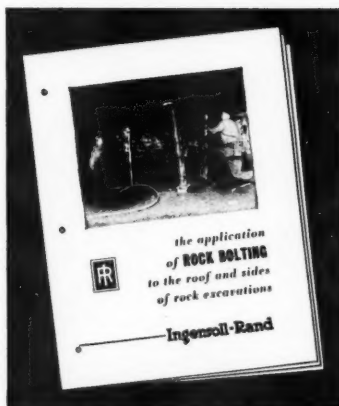
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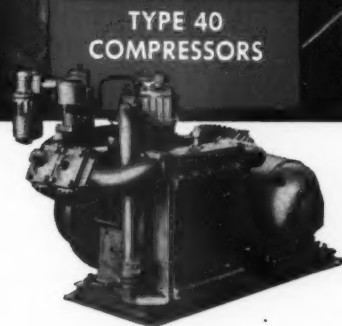


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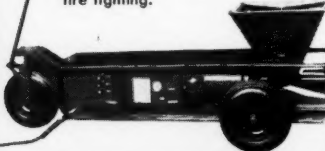
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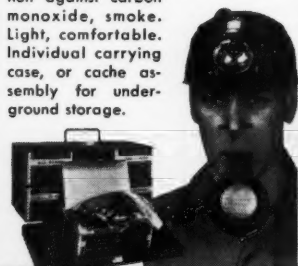
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